A practical tool for evaluating freshwater health and biodiversity across Africa

by

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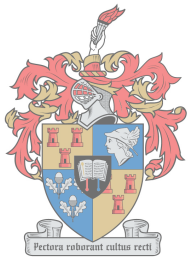

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DECLARATION

By submitting this dissertation electronically, I declare that the entirety of the work contained therein is my own, original work, that I am the sole author thereof (save to the extent explicitly otherwise stated), that reproduction and publication thereof by Stellenbosch University will not infringe any third party rights and that I have not previously in its entirety or in part submitted it for obtaining any qualification.

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ABSTRACT

The diverse African freshwater ecosystems are being increasingly impacted by human activities. Biomonitoring tools are needed to address the level of impacts and success of mitigation. Here a biomonitoring tool, using an effective indicator group (Dragonflies: Odonata), is developed at the African continental scale, while using the South African Dragonfly Biotic Index (DBI) as a starting point. The DBI can be applied to both still and running waters, and is based on three sub-indices (geographical distribution, threat status, and habitat sensitivity) of each dragonfly species. Data on dragonflies has been collated through international effort into the Odonata Database of Africa, used here to develop a new index, the African Dragonfly Biotic Index (ADBI). As with the DBI, the ADBI uses the same first two sub-indices (distribution and threat status), but replaces habitat sensitivity with a species vulnerability sub-index. This is more appropriate for the continental level in view of the quality of data available. Careful data interrogation led to final selection of 604 African dragonfly species for development of the ADBI. While the South African DBI scores were calculated at a national level, the ADBI scores were determined at a continental scale, which necessitated some changes in the calculations of the ADBI scores. To determine exactly how the ADBI deviated from the DBI, these two biotic indices were compared using just the South African dragonfly species as a data sub-set. There was a strong correlation between the Red List threat status sub-index and final scores of the ADBI and DBI, while geographical distribution sub-index scores of the ADBI and DBI were only moderately correlated. The sub-index that contributed most to the deviation of the ADBI from the DBI, was the ADBI species vulnerability sub-index. Although appropriate for a continental scale assessment, the ADBI has shortcomings for national level assessments, where conservation policy and management takes place. This meant that the ADBI had to be translated for specific use in the different countries so as to develop national biomonitoring schemes (i.e. a national DBI). However, as the spatial database created for Africa's dragonflies varies in quality and quantity, the countries are at various levels of national DBI development. Countries were categorized on their potential to develop national DBIs by determining the value of data coverage of each country. Of the 48 African countries (excluding South Africa, which already has a national DBI), there are 12 that are close to being able to implement national DBIs, while another 12 have insufficient data and are not currently able to implement national DBIs. The other 24 countries require much more basic data to instigate national DBIs. Bioassessments of freshwaters takes place at two levels: 1) within political borders, and 2) in biogeographical regions. However, what is expedient at the national level often does not match biogeographical categories (e.g. ecoregions). Hence, the continental-scale ADBI was investigated according to Africa's terrestrial and freshwater ecoregions. There were no significant

differences between assessments using terrestrial vs. freshwater ecoregions, although using terrestrial ecoregions gives a finer interpretation of freshwater condition.

OPSOMMING

Die diverse varswater ekosisteme van Afrika word toenemend deur menslike aktiwiteite belemmer. Bio-moniterings instrumente word benodig om die vlak van impakte en sukses van mitigering te monitor. ’n Bio-moniterings instrument word hier ontwikkel, vir ’n Afrika kontinentale-skaal, deur gebruik te maak van ’n effektiewe aanwysers groep (Naaldekokers: Odonata) en die Suid-Afrikaanse Naaldekoker Biotiese Indeks (NBI) as ’n begin punt. Die NBI word toegepas vir beide stilstaande en lopende water, en is gebaseer op drie sub-indekse (geografiese verspreiding, bedreigings status, en habitat sensitiwiteit) van elke naaldekoker spesie. Inligting oor naaldekokers was deur internasionale ywer in die Odonata Databasis van Afrika (ODA) saamgestel en word hier gebruik om ’n nuwe indeks, die Afrikaan Naaldekoker Biotiese Indeks (ANBI), te ontwikkel. Soos met die NBI, gebruik die ANBI dieselfde twee sub-indekse (verspreiding en bedreigings status), maar vervang habitat sensitiwiteit met ’n spesies kwesbaarheid sub-indeks. Dit is meer gepas vir die kontinentale vlak nemende die kwaliteit van beskikbare inligting. Omsigtige ondersoek van hierdie inligting, het gelei tot die ontwikkeling van die ANBI vir ’n finale seleksie van 604 Afrikaanse naaldekoker spesies. Terwyl die Suid-Afrikaanse NBI punte op ’n nasionale vlak bereken word, was die ANBI punte op ’n kontinentale vlak bepaal, wat sekere verandering in die berekeninge van die ANBI punte vereis het. Om te bepaal presies hoe die ANBI vanaf die NBI afwyk, was hierdie twee biotiese indekse met mekaar vergelyk deur net Suid-Afrikaanse naaldekokers as ’n data-ondergroep te gebruik. Daar was ’n sterk korrelasie tussen die Rooilys bedreigings status sub-indeks en finale punte van die ANBI en NBI, terwyl die geografiese verspreiding sub-index punte van die ANBI en NBI slegs matig gekorreleerd was. Die sub-indeks wat die meeste tot die afwyking van die ANBI vanaf die NBI bygedra het, was die ANBI spesies kwesbaarheid sub-index. Alhoewel geskik vir ’n kontinentale-skaal waardebepaling, het die ANBI tekortkominge vir nasionale vlak waardebepaling, waar bewarings-beleid en bestuur plaasvind. Dit beteken dat die ANBI verander moet word om nasionale bio-moniterings skemas (d.w.s. nasionale NBI) te ontwikkel vir spesifieke gebruik in die verskillende lande. Nietemin, deurdat die ruimtelike databasis, wat vir Afrika se naaldekokers opgestel was, verskil in kwaliteit en kwantiteit, is die lande by verkeie vlakke van nasionale NBI ontwikkeling. Die lande was gekategoriseer volgens hul potentiaal om nasionale NBIs to ontwikkel, deur die waarde van elke land se inligting te ondersoek. Van die 48 lande (uitsluitend Suid-Afrika, wat alreeds ’n nasionale NBI het), is daar 12 wat naby daaraan is om nasionale NBIs te implementeer, terwyl nog 12 lande onvoldoende inligting het en op die oomblik nie in staat is om nasionale NBIs te implementeer nie. Die ander 24 lande vereis baie meer basiese inligting om nasionale NBIs in werking te stel. Bio-waardebepalings van varswater vind plaas op twee vlakke: 1) binne politiese grense, en 2) in biogeografiese streke. Nietemin, wat aangewese is op ’n nasionale vlak, gaan dikwels nie saam met biogeografiese kategorieë nie (bv.

omgewings-streke). Dus, was die kontinentale-skaal ANBI volgens Afrika se land en varswater omgewings-streke ondersoek. Daar was geen betekenisvolle verskille gevind tussen die waardebepalings van land vs. varswater omgewings-streke nie, alhoewel die gebruik van land omgewings-streke ’n nouer interpretasie van die varswater-toestand gee.

DEDICATION

I would like to dedicate my thesis to my parents. I would never have been able to finish my PhD without your love and support. I love you guys!!!

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PREFACE

This dissertation is presented as a compilation of 6 chapters of which 4 are data chapters. Each data chapter is introduced separately and each will be submitted to a relevant journal.

Chapter 1: General Introduction

Chapter 2: A continental-scale index for freshwater assessment based on dragonflies
(*To be submitted for publication*)

Chapter 3: Comparison of national and continental dragonfly biotic indices
(*To be submitted for publication*)

Chapter 4: Prioritizing the African countries for their potential to develop individual national Dragonfly Biotic Indices
(*To be submitted for publication*)

Chapter 5: Value of a dragonfly freshwater assessment index across the terrestrial and freshwater ecoregions of Africa
(*To be submitted for publication*)

Chapter 6: General Conclusion

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CHAPTER 1:
GENERAL INTRODUCTION

1.1 Freshwater biodiversity

Clean freshwater, with its products and services, is vital for the persistence of humans worldwide (Revenga *et al.* 2005; Dudgeon *et al.* 2006). These products and services provided by freshwater ecosystems can include material values (e.g. food, clean water and goods), recreational values (e.g. river rafting), and resistance to anthropogenic impacts (Revenga *et al.* 2005). However, freshwater ecosystems and their biodiversity are increasingly being impacted by adverse anthropogenic activities (e.g. Allan & Flecker 1993; Jackson *et al.* 2001; Malmqvist & Rundle 2002; Dudgeon *et al.* 2006; Vörösmarty *et al.* 2010; Carpenter *et al.* 2011). These impacts can include: water pollution, overexploitation of water resources, invasion by alien species, habitat degradation, and flow modification (Revenga *et al.* 2005; Dudgeon *et al.* 2006; Vörösmarty *et al.* 2010; Carpenter *et al.* 2011)

This is particularly the case for the African continent. With its dry and at times unpredictable climate, combined with a very fast-growing human population, may make any future impacts on its freshwater ecosystems particularly severe (Shumway 1999; Crisman *et al.* 2003; Darwall *et al.* 2011). Moreover, the high diversity of freshwater species and assemblages were brought about by the unique combination of Africa's climatic, topographical, and geographical conditions (Dudgeon *et al.* 2011). This means that the freshwater ecosystems of Africa must not just sustain the wellbeing of its growing human population, but that these ecosystems are also critical for the survival of its rich aquatic biodiversity (Darwall *et al.* 2011). Therefore, it is necessary to monitor any changes within these freshwater ecosystems, so as to identify possible freshwater biodiversity that may be lost.

1.2 Monitoring freshwater ecosystems

There are two approaches that are typically used when the health and ecological integrity of freshwater ecosystems are monitored, i.e. 1) monitoring the physical habitat of a freshwater ecosystem and 2) the biological monitoring of these ecosystems (Revenga *et al.* 2005). The first monitoring method includes the assessment of, for example, the water chemistry, substrate condition or geomorphology (e.g. river bed, stream bank, etc.) and other physical components (e.g. temperature, pH, etc.) of a freshwater ecosystem, such as rivers or streams. Although changes in any of these components are likely to have an effect on the freshwater biodiversity, it can be limited

in terms of indicating the whole freshwater ecosystem, especially regarding the health and integrity of an ecosystem (Revenga *et al.* 2005). As a result, biomonitoring programmes have been developed, using certain taxa as indicators (e.g. plants, fish and invertebrates), to determine the environmental health of an ecosystem (e.g. Campbell 2002).

There are several different types of biomonitoring programmes that have been developed across the world. Many of them use measures, such as species richness or diversity, to assess the biodiversity of freshwater ecosystems. In South Africa, a well-known monitoring programme, the South African Scoring System or SASS, was created to assess the biodiversity of the the country's rivers (Chutter 1994; Dickens & Graham 2002). In addition to assessing the different biotopes (substrate and aquatic vegetation) and water chemistry of the rivers, this programme also uses higher taxa of benthic macroinvertebrates to assess a river's biodiversity (Chutter 1994; Dickens & Graham 2002). Other bioassessment programmes that are also based on the presence of marcoinvertebrates in freshwater ecosystems, include: the bioassessment programme AUSRIVAS (Australian River Assessment Scheme), which was created to assess Australia's rivers (Davies 2000); and in the United Kingdom, the programme RIVPACS (River Invertebrate Prediction And Classification System) is used to assess its rivers (Wright 2000).

Invertebrates are sensitive to environmental change and can be used as indicators of these changing ecological conditions for monitoring and conservation purposes (e.g. Lenhard & Witter 1977; McGeoch 1998; Andersen *et al.* 2002; Campbell 2002; Rainio & Niemelä 2003; Da Rocha *et al.* 2010). However, it is important to use a suitable suite of taxa for which their responses to these changes can be quantified across multiple temporal and spatial scales (Pearson 1994; McGeoch 1998; Andersen 1999). It is also important to consider that a specific group of taxa (indicators) may not be as effective across different ecosystem types, e.g. grasshoppers can act as a good indicator of changing conditions in African grasslands (Samways 1997), while they are less effective in central Europe (Zschokke *et al.* 2000). Furthermore, it is important that the taxon has been well-studied, has a well-known natural history, and can be easily recognised.

1.3 Dragonflies as bioindicators

The insect order Odonata (true dragonflies and damselflies), collectively known as 'dragonflies', is one such taxonomic group that can be used as an indicator of environmental change (Clark & Samways 1996; Foote & Hornung 2005; Smith *et al.* 2007; Oertli 2008; De Olieveira-Junior *et al.* 2015). Globally, dragonflies are widely recognized as an essential tool for the assessment and ranking of freshwater ecosystems according to their health and ecological integrity (e.g. Samways 2005; Silva *et al.* 2010; Simaika & Samways 2011; Kutcher & Bried 2014; Chovanec *et al.* 2015; Dutra & De Marco 2015; Golfieri *et al.* 2016; Martín & Maynou 2016; Valente-Neto *et al.* 2016).

Also, dragonflies are particularly suitable as an assessment tool, because as a group, they consist of suites of species with a range of sensitivities and traits, which characterize any particular water body type, i.e. lentic and lotic (Samways & Steytler 1996).

Therefore, a change in species assemblages indicates some change in the condition of a water body (Samways & Simaika 2016). This is because dragonflies are sensitive to changing habitat structure and condition (Samways & Sharratt 2010), as well as in-water conditions (Kietzka *et al.* 2017). Dragonflies are also mobile, responding to changing environmental conditions, either by moving towards them when favourable, or away from them when not. These freshwater species are also relatively easy to identify in the field, as they are often bright, colourful and conspicuous insects, and are also relatively well-known taxonomically (Corbet 1999; Kalkman *et al.* 2008). For the African continent, a substantial database of dragonfly species, across a wide spatial and temporal scale, has been developed (e.g. Kipping *et al.* 2009; Dijkstra *et al.* 2011; Clausnitzer *et al.* 2012; Dijkstra & Clausnitzer 2014).

1.4 The South African Dragonfly Biotic Index (DBI)

South Africa is a water-scarce country, with its future climate predicted to have higher temperatures and lesser precipitation (Driver *et al.* 2005). This is further exacerbated by anthropogenic threats such as the high volumes of water being used, pollution, and the presence of invasive plants (Darwall *et al.* 2009). Therefore, it is vital to monitor the changing conditions of its freshwater ecosystems. One such biomonitoring tool was recently created, using dragonflies (Odonata), to assess the changing conditions of South Africa's freshwater bodies, i.e. the Dragonfly Biotic Index (DBI). The DBI was initially created by Samways and Taylor (2004), and further developed by Simaika and Samways (2009, 2011, 2012).

The DBI is an assessment tool that can be used to rapidly monitor the fast changing conditions (i.e. health and ecological integrity) of South Africa's freshwater ecosystems. This biotic index is based on the presence of a particular suite of adult dragonfly species, including both true dragonflies (Anisoptera) and damselflies (Zygoptera), at focal sites. Each species has its own DBI score, which is derived from the total of three sub-indices: 1) a species' geographical distribution, 2) its International Union for the Conservation of Nature/Species Survival Commission (IUCN/SSC) Red List threat status, and 3) its sensitivity to anthropogenic disturbance to its habitat. The scores of each of these DBI sub-indices range from 0 to 3, with the final DBI value of each species being the sum of scores for the three sub-indices, and which range from 0 to 9.

These three sub-indices are: The first DBI sub-index, *Geographical Distribution*, is based on the geographical range of the dragonflies across South Africa, which was assessed and scored according to the political boundaries of the country's state provinces. The second DBI sub-index,

Red List Threat Status, is based on both the national and global Red List threat statuses for the individual species. The third sub-index, *Habitat Sensitivity*, it is based on the frequency of occurrence of the dragonflies in fully natural versus human-modified or created habitats. Thus, a dragonfly species that has a widespread distribution, is non-threatened, and is highly tolerant of anthropogenic disturbances, scores 0 (0 + 0 + 0), whereas a species that has a highly restricted distribution, is highly threatened, and is extremely sensitive to habitat disturbances, scores 9 (3 + 3 + 3). A practical manual for freshwater assessment using the DBI has now been developed (Samways & Simaika 2016).

1.5 Research aims

Within this thesis, the focus is on one major freshwater conservation topic with four research aims. These four research aims are: 1) The development of a freshwater biomonitoring tool for the African continent (continental scale), using dragonflies as an indicator group at the species level (Chapter 2), 2) Comparing of this new continental dragonfly biotic index (from Chapter 2) with the original national one to determine the veracity of the new index (Chapter 3), 3) Prioritizing the African countries to determine which ones will be able to develop individual national dragonfly biotic indices (Chapter 4), and 4) Comparative assessement of the continental biotic index across the terrestrial and freshwater ecoregions of Africa (Chapter 5).

In Chapter 2, the main aim is to develop a new biomonitoring tool for the entire African continent, i.e. the African Dragonfly Biotic Index (ADBI), by using the original South African Dragonfly Biotic Index (DBI) as a template, as well as using the comprehensive spatial database of African dragonflies collated by Kipping *et al.* (2009). This meant that the three sub-indices of the South African DBI required some modification so as to develop useful and practical ADBI sub-indices. The South African DBI sub-index of *Geographical Distribution* is based on the conservation-action units of political boundaries of state provinces (Samways & Simaika 2016), which is ideal for South Africa. However, this may not necessarily translate to the rest of the African continent. Consequently, this geographical distribution DBI sub-index, had to be adjusted so as to develop a meaningful geographical distribution sub-index for the African continent.

With regards to the DBI sub-index, *Red List Threat Status*, both the national and global threat statuses are significant (Samways & Simaika 2016), while for the African continent there are currently no national Red List threat statuses, only global ones. The DBI sub-index, *Habitat Sensitivity*, also had to be modified (into a *Vulnerability* sub-index) as it is based on the proportional occurrence of dragonflies in fully natural versus human-modified or created habitats (Samways & Simaika 2016). This could be done for South Africa, as the habitat tolerances of all the

species in the country are relatively well known, which is not the case when the assemblages of dragonflies are scaled up to the continental level.

In Chapter 3, the main aim is to compare the ADBI with the original South African DBI to determine how this continental biotic index relates to the DBI according to the dragonfly species recorded within South Africa. The null hypothesis, is that the ADBI have a one-to-one relationship with the South African DBI. This approach uses both the continental scale of the ADBI and differences in how the ADBI sub-indices were calculated. If there was a one-to-one relationship between these two biotic indices, then the ADBI scores (0 – 9) will be exactly the same as the already assessed DBI scores (0 – 9) for the South African dragonfly species. However, if it was found that there is no or only a weak relationship between these two biotic indices, the second objective was to determine which of the three ADBI sub-indices (i.e. geographical distribution, threat status, and/or species vulnerability) had the greatest influence on calculating the ADBI scores, and deviating from those of the original DBI scores.

In Chapter 4, the main aim is to determine which African countries have the potential to develop national DBI scores by considering the ADBI scores (0 – 9) according to the political borders of these African countries. The null hypothesis, is that each African country (48) has an equal opportunity to create national DBI scores. The ultimate objective of the ADBI, is to use this biotic index for the conservation of different freshwater ecosystems within Africa. However, conservation planning is usually based on conservation-action units, which can be heavily influenced by the political boundaries of countries. Therefore, using the ADBI, which was created on a continental scale, for any conservation action regarding the freshwater ecosystems within any particular country, may be influenced by the political boundaries of those countries. To overcome this challenge, and to better assist freshwater managers in future to conserve these ecosystems, the ADBI (continental scale) must be modified to a national scale, i.e. creating DBI scores of 0 – 9 for each dragonfly species within each country.

Finally, in Chapter 5, the main aim is to investigate the value of the ADBI scores (0 – 9) according to the conservation-action unit, the biogeographical ecoregions of the African continent, which are at a finer spatial scale, and therefore a more accurate assessment method, than the ADBI as a continental-scale index. As with conservation in general, what may be expedient at a national level, usually does not match well with the biogeographical regions, such as the ecoregions, of an area. Thus, the the value of the ADBI scores (0 – 9) was investigated according to the biogeographical regions, terrestrial (Olson *et al.* 2001) and freshwater ecoregions (Abell *et al.* 2008). Accordingly, the null hypothesis, is that both the terrestrial and freshwater ecoregions have equal value according to the species composition and therefore, the recorded ADBI scores (0 – 9).

REFERENCES

Abell, R., Thieme, M.L., Revenga, C., Bryer, M., Kottelat, M., Bogutskaya, N., Coad, B., Mandrak, N., Balderas, S.C., Bussing, W., Stiassny, M.L.J., Skelton, P., Allen, G.R., Unmack, P., Naseka, A., Ng, R., Sindorf, N., Robertson, J., Armijo, E., Higgins, J.V., Heibel, T.J., Wikramanayake, E., Olson, D., López, H.L., Reis, R.E., Lundberg, J.G., Sabaj Pérez, M.H. and Petry, P. 2008. Freshwater ecoregions of the World: A new map of biogeographic units for freshwater biodiversity conservation. *BioScience* **58**: 403-414.

Allan, J.D. and Flecker, A.S. 1993. Biodiversity conservation in running waters. *BioScience* **43**: 32-43.

Andersen, A.N. 1999. My bioindicator or yours? Making the selection. *Journal of Insect Conservation* **3**: 61-64.

Andersen, A.N., Hoffmann, B.D., Müller, W.J. and Griffiths, A.D. 2002. Using ants as bioindicators in land management: simplifying assessment of ant-community responses. *Journal of Applied Ecology* **39**: 8-17.

Campbell, I.C. 2002. Biological monitoring and assessment using invertebrates. In: F.R. Burden, U. Foerstner, I.D. McKelvie and A. Guenther (eds.), *Environmental Monitoring Handbook*, pp. 5.1-5.16. McGraw-Hill, New York.

Carpenter, S.R., Stanley, E.H. and Vander Zanden, M.J. 2011. State of the World's freshwater ecosystems: physical, chemical, and biological changes. *Annual Review of Environment and Resources* **36**: 75-99.

Chovanec, A., Schindler, M, Waringer, J. and Wimmer, R. 2015. The Dragonfly Association Index (Insecta: Odonata) – A tool for the type-specific assessment of lowland rivers. *River Research and Applications* **31**: 627-638.

Chutter, F.M. 1994. The rapid biological assessment of streams and river water quality by means of macroinvertebrate communities in South Africa. In: M.C. Uys (ed.), *Classification of Rivers and Environmental Health Indicators*, pp. 217-234. Water Research Commission Report No. TT 63/94, South Africa.

Clark, T.E. and Samways, M.J. 1996. Dragonflies (Odonata) as indicators of biotope quality in the Kruger National Park, South Africa. *Journal of Applied Ecology* **33**: 1001-1012.

Clausnitzer, V., Dijkstra, K.-D.B., Koch, R., Boudot, J.-P., Darwall, W.R.T., Kipping, J., Samraoui, B., Samways, M.J., Simaika, J.P. and Suhling, F. 2012. Focus on African freshwaters: hotspots of dragonfly diversity and conservation concerns. *Frontiers in Ecology and the Environment* **10**: 129-134.

Crisman, T.L., Chapman, L.J., Chapman, C.A. and Kaufman, L.S. (eds.). 2003. *Conservation, Ecology, and Management of African Freshwaters*. University of Florida Press, Gainesville, USA.

Corbet, P.S. 1999. *Dragonflies: Behaviour and Ecology of Odonata*. Harley Books, Colchester, UK.

Da Rocha, J.R.M., Almeida, J.R., Lins, G.A. and Durval, A. 2010. Insects as indicators of environmental changing and pollution: A review of appropriate species and their monitoring. *Holos Environment* **10**: 250–262.

Darwall, W.R.T., Smith, K.G., Allen, D.J., Holland, R.A., Harrison, I.J. and Brooks, E.G.E. (eds.). 2011. *The Diversity of Life in African Freshwaters: Under Water, Under Threat. An Analysis of the Status and Distribution of Freshwater Species throughout Mainland Africa.* IUCN, Cambridge, UK and Gland, Switzerland.

Darwall, W.R.T, Smith, K.G., Tweddle, D. and Skelton, P. (eds.). 2009. *The Status and Distribution of Freshwater Biodiversity in Southern Africa.* IUCN, Gland, Switzerland and SAIAB, Grahamstown, South Africa.

Davies, P.E. 2000. Development of a national river bioassessment system (AUSRIVAS) in Australia. In: J.F. Wright, D.W. Sutcliffe and M.T. Furse (eds.), *Assessing the Biological Quality of Freshwaters: RIVPACS and other Techniques*, pp. 113-124. Freshwater Biological Association, Cumbria, UK.

De Olieveira-Junior, J.M.B., Shimano, Y., Gardner, T.A., Hughes, R.M., De Marco Júnior, P. and Juen, L. 2015. Neotropical dragonflies (Insecta: Odonata) as indicators of ecological condition of small streams in the eastern Amazon. *Austral Ecology* **40**: 733-744.

Dickens, C.W.S. and Graham, P.M. 2002. The South African Scoring System (SASS) Version 5 Rapid Bioassessment Method for Rivers. *African Journal of Aquatic Science* **27**: 1-10.

Dijkstra, K.-D.B., Boudot, J.-P., Clausnitzer, V., Kipping, J., Kisakye, J.J., Ogbogu, S.S., Samraoui, B., Samways, M.J., Schütte, K., Simaika, J.P., Suhling, F. and Tchibozo, S.L. 2011. Dragonflies and damselflies of Africa (Odonata): history, diversity, distribution, and conservation. In: W.R.T Darwall, K.G. Smith, D.J. Allen, R.A. Holland, I.J. Harrison and E.G.E Brooks (eds.), *The Diversity of Life in African Freshwaters: Under Water, Under Threat. An Analysis of the Status and Distribution of Freshwater Species throughout Mainland Africa*, pp. 126-177. IUCN, Cambridge, UK and Gland, Switzerland.

Dijkstra, K.-D.B. and Clausnitzer, V. 2014. *The Dragonflies and Damselflies of Eastern Africa. Handbook for all Odonata from Sudan to Zimbabwe*. Studies in Afrotropical Zoology, vol. 298. Royal Museum for Central Africa, Tervuren, Belgium.

Driver, A., Maze, K., Rouget, M., Lombard, A.T., Nel, J., Turpie, J.K., Cowling, R.M., Desmet, P., Goodman, P., Harris, J., Jonas, Z., Reyers, B., Sink, K. and Strauss, T. 2005. *National Spatial Biodiversity Assessment 2004: Priorities for Biodiversity Conservation in South Africa*. *Strelitzia* 17. South African National Biodiversity Institute, Pretoria.

Dudgeon, D., Arthington, A.H., Gessner, M.O., Kawabata, Z.-I., Knowler, D.J., Lévêque, C., Naiman, R.J., Prieur-Richard, A.-H., Soto, D., Stiassny, M.L.J. and Sullivan, C.A. 2006. Freshwater biodiversity: importance, threats, status and conservation challenges. *Biological Reviews* **81**: 163-182.

Dudgeon, D., Paugy, D., Lévêque, C., Rebelo, L.-M. and McCartney, M.P. 2011. Background. In: W.R.T Darwall, K.G. Smith, D.J. Allen, R.A. Holland, I.J. Harrison and E.G.E Brooks (eds.), *The Diversity of Life in African Freshwaters: Under Water, Under Threat. An Analysis of the Status and Distribution of Freshwater Species throughout Mainland Africa*, pp. 126-177. IUCN, Cambridge, UK and Gland, Switzerland.

Dutra, S. and De Marco, P. 2015. Bionomic differences in odonates and their influence on the efficiency of indicator species of environmental quality. *Ecological Indicators* **49**: 132-142.

Foote, A.L. and Hornung, C.L.R. 2005. Odonates as biological indicators of grazing effects on Canadian prairie wetlands. *Ecological Entomology* **30**: 273-283.

Golfieri, B., Hardersen, S., Maiolini, B. and Surian, N. 2016. Odonates as indicators of the ecological integrity of the river corridor: Development and application of the Odonate River Index (ORI) in northern Italy. *Ecological Indicators* **61**: 234-247.

Jackson, R.B., Carpenter, S.R., Dahm, C.N., McKnight, D.M., Naiman, R.J., Postel, S.L. and Running, S.W. 2001. Water in a changing world. *Ecological Applications* **11**: 1027-1045.

Kalkman, V.J., Clausnitzer, V., Dijkstra, K.-D.B., Orr, A.G., Paulson, D.R. and Van Tol, J. 2008. Global diversity of dragonflies (Odonata) in freshwater. *Hydrobiologia* **595**: 351-363.

Kietzka, G.J., Pryke, J.S. and Samways, M.J. 2017. Aerial adult dragonflies are highly sensitive to in-water conditions across an ancient landscape. *Diversity and Distributions* **23**: 14-26.

Kipping, J., Dijkstra, K.-D.B., Clausnitzer, V., Suhling, F. and Schütte, K. 2009. Odonata Database of Africa (ODA). *Agrion* **13**: 20-23.

Kutcher, T.E. and Bried, J.T. 2014. Adult Odonata conservatism as an indicator of freshwater wetland condition. *Ecological Indicators* **38**: 31-39.

Lenhard, S.C. and Witter, J.A. 1977. Insects as Biological Indicators of Environmental Change. *Bulletin of the Entomological Society of America* **23**: 191-193.

Malmqvist, B. and Rundle, S. 2002. Threats to the running water ecosystems of the world. *Environmental Conservation* **29**: 134-153.

Martín, R. and Maynou, X. 2016. Dragonflies (Insecta: Odonata) as indicators of habitat quality in Mediterranean streams and rivers in the province of Barcelona (Catalonia, Iberian Peninsula). *International Journal of Odonatology* **19**: 107-124.

McGeoch, M.A. 1998. The selection, testing and application of terrestrial insects as bioindicators. *Biological Reviews* **73**: 181-201.

Oertli, B. 2008. The use of dragonflies in the assessment and monitoring of aquatic habitats. In: A. Córdoba-Aguilar (ed.), *Dragonflies and Damselflies: Model Organisms for Ecological and Evolutionary Research*, pp. 79-95. Oxford University Press, Oxford.

Olson, D.M., Dinerstein, E., Wikramanayake, E.D., Burgess, N.D., Powell, G.V.N., Underwood, E.C., D'Amico, J.A., Itoua, I., Strand, H.E., Morrison, J.C., Loucks, C.J., Allnutt, T.F., Ricketts, T.H., Kura, Y., Lamoreux, J.F., Wettengel, W.W., Hedao, P. and Kassem, K.R. 2001. Terrestrial ecoregions of the world: A new map of life on earth. *BioScience* **51**: 933-938.

Pearson, D.L. 1994. Selecting indicator taxa for the quantitative assessment of biodiversity. *Philosophical Transactions of the Royal Society B: Biological Sciences* **345**: 75-79.

Rainio, J. and Niemelä, J. 2003. Ground beetles (Coleoptera: Carabidae) as bioindicators. *Biodiversity and Conservation* **12**: 487-506.

Revenga, C., Campbell, I., Abell, R., De Villiers, P. and Bryer, M. 2005. Prospects for monitoring freshwater ecosystems towards the 2010 Targets. *Philosophical Transactions of the Royal Society B: Biological Sciences* **360**: 397-413.

Shumway, C.A. 1999. *Forgotten Waters: Freshwater and Marine Ecosystems in Africa*. Strategies for biodiversity conservation and sustainable development. Boston University, Boston, USA.

Samways, M.J. 1997. Conservation biology of Orthoptera. In: S.K. Gangwere, M.C. Muralirangan and M. Muralirangan (eds), *The Bionomics of Grasshoppers, Katydids and their Kin*, pp. 481-496. CAB International, Wallingford, UK.

Samways, M.J. 2005. Dragonflies: sensitive indicators of freshwater health. In: M.L. Thieme, R. Abell, M.L.J. Stiassny, P. Skelton, B. Lehner, G.G. Teugels, E. Dinerstein, A.K. Toham, N. Burgess and D. Olson (eds.), *Freshwater Ecoregions of Africa and Madagascar: A conservation assessment*, pp. 19-21. Island Press, Washington DC, USA.

Samways, M.J. and Sharratt, N.J. 2010. Recovery of endemic dragonflies after removal of invasive alien trees. *Conservation Biology* **24**: 267-277.

Samways, M.J. and Simaika, J.P. 2016. *Manual of Freshwater Assessment for South Africa: Dragonfly Biotic Index*. *Suricata* 2. South African National Biodiversity Institute, Pretoria, South Africa.

Samways, M.J. and Steytler, N.S. 1996. Dragonfly (Odonata) distribution patterns in urban and forest landscapes, and recommendations for riparian management. *Biological Conservation* **78**: 279-288.

Samways, M.J. and Taylor, S. 2004. Impacts of invasive alien plants on Red-listed South African dragonflies (Odonata). *South African Journal of Science* **100**: 78-80.

Silva, D. de paiva, De Marco, P. and Resende, D.C. 2010. Adult odonate abundance and community assemblage measures as indicators of stream ecological integrity: A case study. *Ecological Indicators* **10**: 744-752.

Simaika, J.P. and Samways, M. J. 2009. An easy-to-use index of ecological integrity for prioritizing freshwater sites and for assessing habitat quality. *Biodiversity and Conservation* **18**: 1171-1185.

Simaika, J.P. and Samways, M.J. 2011. Comparative assessment of indices of freshwater habitat conditions using different invertebrate taxon sets. *Ecological Indicators* **11**: 370-378.

Simaika, J.P. and Samways, M.J. 2012. Using dragonflies to monitor and prioritize lotic systems: a South African perspective. *Organisms, Diversity and Evolution* **12**: 251-259.

Smith, J., Samways, M.J. and Taylor, S. 2007. Assessing riparian quality using two complementary sets of bioindicators. *Biodiversity and Conservation* **16**: 2695-2713.

Valente-Neto, F., Roque, F. de Oliveira, Rodrigues, M.E., Juen, L. and Swan, C.M. 2016. Toward a practical use of Neotropical odonates as bioindicators: Testing congruence across taxonomic resolution and life stages. *Ecological Indicators* **61**: 952-959.

Vörösmarty, C.J., McIntyre, P.B., Gessner, M.O., Dudgeon, D., Prusevich, A., Green, P., Glidden, S., Bunn, S.E., Sullivan, C.A., Reidy Liermann, C. and Davies, P.M. 2010. Global threats to human water security and river biodiversity. *Nature* **467**: 555-561.

Wright, J.F. 2000. An introduction to RIVPACS. In: J.F. Wright, D.W. Sutcliffe and M.T. Furse (eds.), *Assessing the Biological Quality of Freshwaters: RIVPACS and other Techniques*, pp. 1-24. Freshwater Biological Association, Cumbria, UK.

Zschokke, S., Dolt, C. Rusterholz, H.-P., Oggier, P., Braschler, B., Thommen, G.H., Lüdin, E., Erhardt, A. and Baur, B. 2000. Short-term responses of plants and invertebrates to experimental small-scale grassland fragmentation. *Oecologia* **125**: 559-572.

CHAPTER 2

A continental-scale index for freshwater assessment based on dragonflies

ABSTRACT

The highly diverse freshwater ecosystems of Africa are increasingly impacted by severe anthropogenic pressures. It is ever more apparent that a biomonitoring tool is needed to assess these impacts for future conservation actions. However, applicable methods and indicator taxa that can be used to efficiently and rapidly monitor changing conditions within these freshwater ecosystems are still lacking for the African continent. A recently developed biomonitoring tool, the Dragonfly Biotic Index (DBI), was created to rapidly assess the conditions of South Africa's freshwater ecosystems. It is based on the principles of assessing three sub-indices (i.e. geographical distribution, threat status and habitat sensitivity) of each South African dragonfly species within the country, which then provides an overall estimate of the possible health of its freshwater ecosystems. The IUCN/Species Survival Commission (SSC) has assessed certain aquatic taxa in Africa, including dragonflies. This has made it possible to expand on the South African DBI and create a continental-scale biomonitoring index using the same principles as the DBI, i.e. the African Dragonfly Biotic Index (ADBI). Data provided by the IUCN/SSC made it possible to calculate, with some modifications, the three sub-indices of the ADBI. Final ADBI scores were calculated for 604 African dragonfly species. The ADBI is the first framework to provide a broad perspective for understanding the vulnerability of an aquatic taxon to anthropogenic disturbances at a very large spatial scale. This framework has the potential to serve as starting point for the development of other national DBI's beyond that already developed for South Africa. As a means for monitoring changes over the continent in years to come, the ADBI also has the potential to help identify threats and sensitivities to freshwater ecosystems, which means that appropriate conservation action can be taken in the future.

Abbreviations used: ADBI – African Dragonfly Biotic Index; ADHM – African Dragonfly Habitat Matrix; DBI – Dragonfly Biotic Index (South Africa); IUCN/SSC – International Union for the Conservation of Nature/Species Survival Commission; ODA – Odonata Database of Africa.

1. INTRODUCTION

Freshwaters are increasingly impacted by adverse anthropogenic activities (e.g. Allan & Flecker 1993; Jackson *et al.* 2001; Malmqvist & Rundle 2002; Dudgeon *et al.* 2006; Vörösmarty *et al.* 2010; Carpenter *et al.* 2011). This is particularly so in Africa, where the world's driest and most unpredictable tropical climate, combined with one of the fastest growing human populations, will make any future impacts on freshwater ecosystems on this continent particularly severe (i.e. Shumway 1999; UNEP 2002; Darwall *et al.* 2011). Africa's unique combination of geographical, climatic and topographical conditions has given rise to its high diversity of freshwater species and assemblages (Dudgeon *et al.* 2011). This means that, in addition to sustaining the wellbeing of the growing human population, the freshwater ecosystems of Africa are also essential for the survival of its rich aquatic biodiversity (Darwall *et al.* 2011). Consequently, to identify possible aquatic diversity that may be lost and which potential offset areas are valuable, requires monitoring activities of any changes as well as environmental impact assessments. However, applicable methods and indicator taxa that can be used to efficiently and rapidly monitor changing conditions within these freshwater ecosystems, as well as having unified habitat-indices that can be understood by non-biologists, are still lacking for the entire African continent.

On the African continent, South Africa has paved the way in developing two freshwater monitoring tools that are based on bioindicators for assessing the health of its freshwater ecosystems, i.e. the South African Scoring System (SASS) and the more recent Dragonfly Biotic Index (DBI). SASS was developed to rapidly assess the health of southern Africa's rivers by using benthic macroinvertebrates (Chutter 1994), which are relatively visible to the naked eye, are easy to identify and have rapid seasonal life cycles (Dickens & Graham 2002). However, this tool has some shortcomings, one being that it can only be used to assess river health and not that of still waters (Dickens & Graham 2002; Samways & Simaika 2016). Also, it can only assess the overall responses of higher macroinvertebrate taxa to possible threats rather than at the more sensitive species level (Simaika & Samways 2011). It also requires the evaluator to wade into the river systems to gather the necessary data, which can be potentially hazardous as the evaluator can be exposed, for example, to dangerous pathogens and vertebrates (Dickens & Graham 2002; Samways & Simaika 2016).

A more recent biomonitoring tool, the Dragonfly Biotic Index (DBI), was invented by Samways and Taylor (2004), and further developed by Simaika and Samways (2009, 2011, 2012) for the rapid assessment of the conditions of South Africa's freshwater ecosystems, both lentic and lotic. This tool is primarily based on the presence of adult dragonfly species (Odonata), including the true dragonflies (Anisoptera) as well as the damselflies (Zygoptera). Dragonflies are widely

recognized to potentially be excellent indicator species (i.e. Chovanec 2000; Smith *et al.* 2007; Dutra & De Marco 2015; Golfieri *et al.* 2016; Valente-Neto *et al.* 2016) as they are bright, colourful, conspicuous and well-known insects (Corbet 1999). Indeed, they can act as indicators of freshwater health (Oertli 2008; Simaika & Samways 2011; Kutcher & Bried 2014) as well as of ecological integrity (Smith *et al.* 2007; Silva *et al.* 2010). Dragonflies are also highly mobile species that can rapidly respond to changing environmental conditions, either by moving towards them when favourable or away from them when not (Samways & Simaika 2016).

Therefore, the presence of a certain assemblage of dragonfly species at focal freshwater ecosystems, whether lentic or lotic, can be an indication of the ecological integrity of that freshwater body. In other words, a certain suite of dragonfly species recorded at a site can indicate the extent to which a system has moved away from the historic, undisturbed baseline. This measure magnifies the difference between, on one hand, species that are geographically widespread, not threatened, and tolerant of anthropogenic disturbed ecosystems, and on the other hand, those that are geographically restricted, threatened with extinction, and highly intolerant of anthropogenic disturbances to their habitats.

Each species has a particular DBI value and this value is derived from the total of three sub-indices: 1) the species' geographical distribution, 2) the International Union for the Conservation of Nature/Species Survival Commission (IUCN/SSC) Red List threat status, and 3) the sensitivity of each species to anthropogenic disturbances to their habitats. The scores of each of these DBI sub-indices range from 0 to 3, with the final DBI value of each species being the sum of scores for the three sub-indices, which ranges from 0 to 9. In other words, a dragonfly species that has a widespread distribution range, is non-threatened and is highly tolerant of anthropogenic disturbances scores 0 (0 + 0 + 0), whereas a species that has a highly restricted distribution range, is highly threatened and extremely sensitive to habitat disturbances scores 9 (3 + 3 + 3). A description of these three sub-indices as they are classified and scored is given in Appendix A1, taken from Samways and Simaika (2016).

On the African continent, besides a few economically important species or species that are connected to the interests of human health, its aquatic fauna is inadequately studied and understood (Dudgeon *et al.* 2011). To improve on this information, the IUCN/SSC gathered considerable information on the conditions and biodiversity of certain aquatic taxa (i.e. fish, freshwater molluscs, dragonflies, crabs and aquatic plants) occurring in the freshwater ecosystems across the African mainland (Darwall *et al.* 2011). However, these data have not yet been transformed into practical tools that can be used to monitor the changing conditions of Africa's freshwater ecosystems.

Besides having a practical indicator that can be used to monitor the health of these ecosystems, the ecological sensitivity and possible vulnerability of particular indicator species

needs to be known for the tool to be applicable. However, the African continent as a whole is lacking a biomonitoring tool that can be used to rapidly assess the changing conditions of its freshwater ecosystems. Therefore, the main aim here is to create a biomonitoring tool for the rapid assessment of all types of freshwater ecosystems across the Africa continent. As there are considerable data available on Africa's dragonflies (e.g. distribution, ecological sensitivity and regional uniqueness), it was decided to modify and expand on the South African DBI for applicability across the whole continent.

However, to do this, all three sub-indices of the DBI required some modification. The reason for modifying the habitat sensitivity sub-index is that this DBI sub-index was based on the proportional occurrence of dragonflies in fully natural versus human-modified or created habitats. This could be done for South Africa, as the habitat tolerances of all the species in the country are relatively well known, which is not so when the odonate assemblage is scaled up to the continental level. As regards to the Red List threat status DBI sub-index, both the national and global statuses are significant, whereas for the whole continent, there are no national Red List threat statuses, only global ones. Furthermore, the geographical distribution DBI sub-index is based on conservation-action units, i.e. the political boundaries of state provinces. This meant that an alternative geographical approach had to be adopted for the African continent that was both practical and yet useful for the development of a meaningful sub-index.

2. DATA DEVELOPMENT AND METHODS

2.1 Databases

For this study, two distinct databases were used: the Odonata Database of Africa (ODA) and the African Dragonfly Habitat Matrix (ADHM). The ODA is a comprehensive spatial database of dragonfly species across the African continent (e.g. Kipping *et al.* 2009; Dijkstra *et al.* 2011; Clausnitzer *et al.* 2012; Simaika *et al.* 2013), that at the time of the analysis here, contains 125 978 individual records. The ADHM is a matrix describing the preference of each of the 708 species identified for the African continent, across a spectrum of habitat types, i.e. the 'habitat width' of each species. This 'habitat width' was categorised according to three main habitat types, i.e. landscape (presence or absence of canopy cover), water body (lentic and lotic) and microhabitat (substrate and vegetation).

2.1.1 The Odonata Database of Africa (ODA)

The ODA is based on the spatial distribution records of the dragonfly species across the entire African continent, which includes observations in the field, collections (both private and museum) and publications. Also included, are the records from the main islands around Africa (e.g. Madagascar, Mauritius, Seychelles, Spain Canary Islands, São Tomé and Príncipe Islands) as well as the various small islands that connect to larger mainland countries, such as Annobon Island of Equatorial Guinea. These records date from the years 1700 to 2014. Along with the species scientific names, the ODA stores the names of the authors of the species, year of description, the species' global Red List threat status, recorded date of observation and/or collection, and location at which it was recorded (i.e. country, province, locality, elevation, habitat description, and latitude and longitude coordinates).

Additionally, information on the life cycle stage of the specimen is also included (e.g. larva, teneral or adult) as well as its reproductive behaviour, if observed (e.g. tandem flight, copulation or ovipositioning). Also included, is the source of the data, i.e. the record category (e.g. observation, literature, etc.), type of data source (e.g. museum, private, etc.), collector's name, and name of the collection where the specimen is housed. Finally, comments are made as to whether there is any uncertainty with the taxonomy and/or geographical distribution. All this information was collated by Kipping *et al.* (2009).

As with the IUCN/SSC Red List assessments of the various aquatic taxa located in the African mainland freshwater ecosystems (Darwall *et al.* 2011), this study also focuses only on the African mainland. As a result, for the purpose of this study, all the island records, including those islands that are connected to the mainland countries, were removed from the ODA. Moreover, the following records were also removed from the ODA: all records where there was uncertainty over the taxonomy and/or geographical distribution, all records that did not have valid scientific names, and all the records that did not have any valid latitude and longitude coordinates. Consequently, the final ODA version that was used here, had approximately 115 000 records. A map of the spatial spread of these distribution records is shown in Figure 2.1.

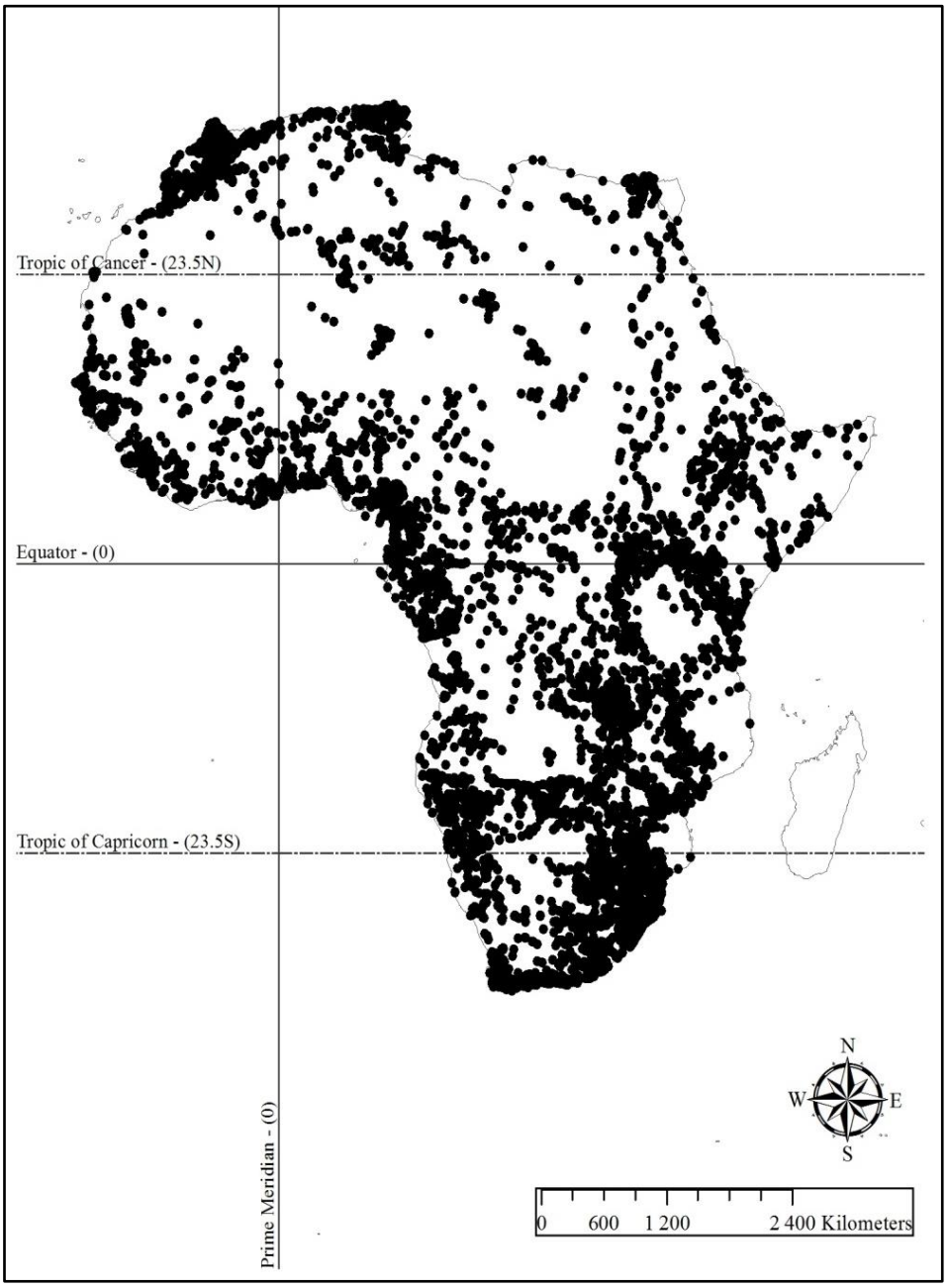


Figure 2.1. Spatial spread of distribution records of individual dragonflies from the Odonata Database of Africa. Each dot represents one distribution record of a dragonfly species.

2.1.2 Development of the African Dragonfly Habitat Matrix (ADHM)

As there are few direct observations of African dragonfly species' vulnerability to habitat disturbances, a sensitivity sub-index as used for the South African DBI could not be used for a pan-African study. This meant that a vulnerability sub-index had to be developed, that would express indirectly the 'habitat width' of each species (i.e. the occurrence of each species across a spectrum of habitat types) and the known levels of sensitivity of that habitat types to anthropogenic disturbances ('habitat sensitivity'). As a result, the ADHM was created – a matrix that contains the description of each dragonfly species' habitat width, as evaluated by a group of African dragonfly specialists (15 people) during a workshop that was held at Stellenbosch University in November 2013.

To define the habitat width of each species, the matrix was first divided into the three main habitat types, i.e. landscape (presence or absence of canopy cover), water body type (lentic and lotic), and microhabitat (substrate and vegetation). Each of these main habitat types was further sub-divided into several different attributes that represent the various environmental characteristics in which each dragonfly species may occur. Accordingly, 'landscape' was divided into four attributes, 'water body' into 12 attributes, and 'microhabitat' into 11 attributes (i.e. four for substrate and seven for vegetation). In total, 27 attributes were used to determine each dragonfly species' habitat width. The codes and descriptions of each of these 27 attributes are listed in Appendix A2.

To establish the exact habitat width of each species, values ranging from zero to three were used by the dragonfly specialists to indicate the particular preference each species' has for each of these attributes. These values are: 0 – presence or absence of a species inconsequential when the attribute has no impact on the species' survival (neutral habitat preference), 1 – species' preference of attribute is inferred or suspected, but is not essential for survival (assumed positive habitat preference), 2 – species' preference of attribute often exists, but is not essential for survival (positive habitat preference), 3 – attribute is the absolute chosen habitat type and is an essential microhabitat for a species' survival (its exclusive habitat preference). This finalised habitat width matrix was used to determine the sensitivity of these habitat types to anthropogenic disturbances and accordingly, the species vulnerability to anthropogenic disturbances.

2.2. The African Dragonfly Biotic Index (ADBI)

The African Dragonfly Biotic Index or ADBI consists of three sub-indices: 1) a species' geographical distribution, 2) its global Red List threat status, and 3) its vulnerability to anthropogenic disturbances. These three sub-indices were measured at two different spatial scales, i.e. the species' threat status were determined at a global scale, while their geographical distribution and vulnerability to anthropogenic disturbances were assessed at a continental scale. Furthermore,

each of these three sub-indices was scored for each of the selected African dragonfly species. Any dragonfly species' can have any one sub-score ranging from 0 to 3, and as each individual species is assigned three sub-index scores, a species' ADBI can range from 0 to 9. Below is how the scores were established for each of the three sub-indices.

2.2.1 ADBI sub-index 1: Geographical Distribution

As the data here are measured at both large spatial and temporal scales, the distribution data being used within this study can be expressed from both an extensive geographical and historical perspective (Brown 1995; Gaston & Blackburn 2000). That is to say, numerous dragonfly species are used in this study (708 spp.), which were sampled over an extensive spatial scale (the African continent) as well as over a long time period (from 1700 to 2014). Therefore, it was possible to calculate the area between the outermost limits of each species occurrence in their respective geographical ranges, i.e. calculating each species range size (i.e. Gaston & Blackburn 2000). Consequently, the geographical distribution sub-index score was determined by first establishing the maximum and minimum values of the individual species' latitude and longitude (geographical) ranges, which were measured in decimal degrees (°). Next, the differences between these maximum and minimum values were calculated. This provided the respective East/West [E/W (latitude)] and North/South [N/S (longitude)] ranges for the individual species, i.e. the latitude-longitude range sizes of each species.

Using STATISTICA version 13 (Dell Inc. 2016), these latitude and longitude ranges were plotted against each other as coded scatterplots (i.e. coded according to each individual species), with each species allocated to a chart. For both the E/W (latitude) and N/S (longitude) ranges, the axes were scaled from 0° to 100° in step sizes of 5° (Fig. 2.2). This provided a practical platform to assign each species' with geographical distribution sub-index scores. The scoring system of this sub-index was as follows: species occurring within the latitude-longitude range size of 0° to 5.00° have a very narrow distribution range and received a score of 3; species within the latitude-longitude range size of 5.01° to 25.00° have a narrow distribution range and received a score of 2; species within the latitude-longitude range size of 25.01° to 50.00° have a wider distribution range and received a score of 1; and species occurring above the latitude-longitude range size of 50.01° have a very wide distribution range and received a score of 0 (Table 2.1 and Fig. 2.2).

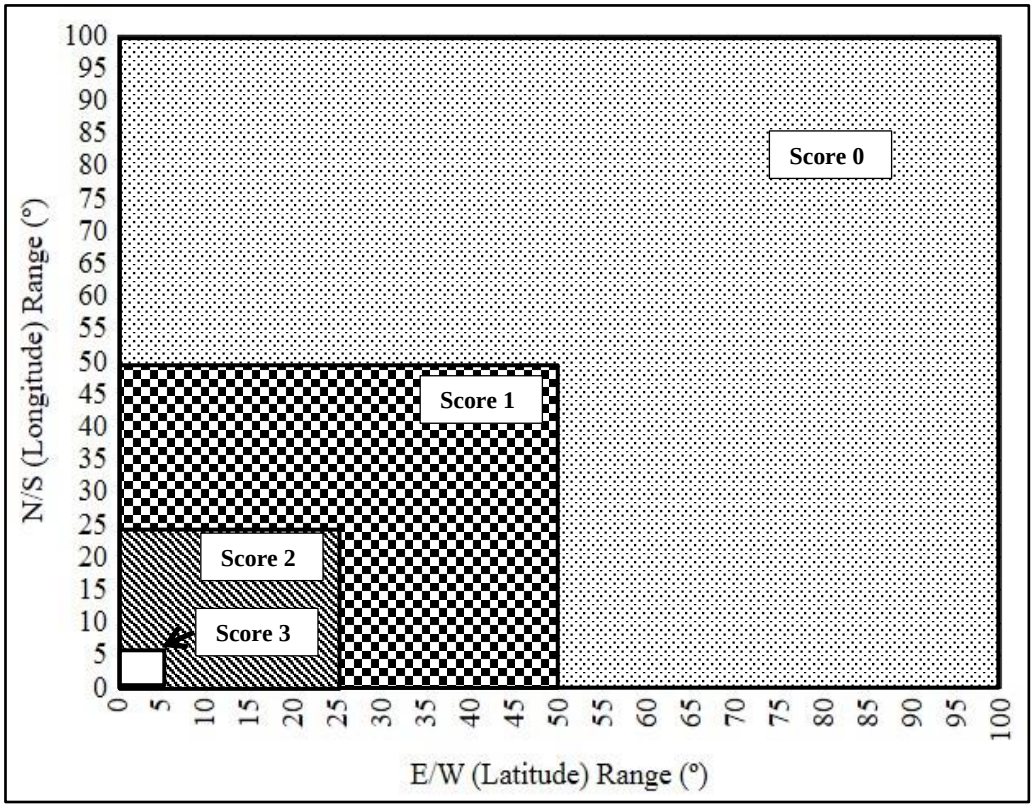


Figure 2.2. An illustrative sketch of how each dragonfly species' geographical distribution sub-index score was calculated, by plotting the E/W (latitude) range (x-axis) against the N/S (longitude) range (y-axis). The scores were established depending on where the markers for each species were drawn. Thus: a marker between the latitude-longitude range size of 0º and 5.00º was assigned a score of 3; a marker between the latitude-longitude range size of 5.01º and 25.00º, a score of 2; a marker between the latitude-longitude range size of 25.01º and 50.00º, a score of 1; and a marker over the latitude-longitude range size of 50º, a score of 0.

2.2.2 ADBI sub-index 2: Threat Status

The threat status sub-index score was determined by using the global IUCN/SSC Red List threat status, as established by the IUCN Red List Categories and Criteria, version 3.1 (second edition), for all African dragonflies (IUCN 2016). The threat statuses that were evaluated are: Least Concern (LC), Near Threatened (NT), Data Deficient (DD), Vulnerable (VU), Endangered (EN) and Critically Endangered (CR). The scoring for this sub-index is given in Table 2.1.

2.2.3 ADBI sub-index 3: Species Vulnerability

There were three facets that were taken into consideration when a species' vulnerability sub-index score was calculated: 1) a species' habitat width of its ecological niche as described in the ADHM (section 2.1.2), 2) its habitat width's degree of sensitivity to anthropogenic disturbances (habitat sensitivity), and 3) the stressor, i.e. the impact of anthropogenic disturbances. To determine the sensitivity of each species' habitat width to anthropogenic disturbances, the impact of anthropogenic disturbances or stressors had to be taken into account. Consequently, three key stressors that may have an impact on dragonfly assemblages and which have the potential to be quantified were identified. They are: 1) habitat conversion (mostly deforestation, agricultural conversion, mining, and/or urbanization), 2) water management such as construction of dams and reservoirs, and 3) presence of alien trees, which can shade out certain sunlit dragonfly habitats.

The first step was to subjectively give a weight to each attribute of the three main habitat types ('habitat width') while taking into account the possible impacts of the three stressors. Consequently, the attributes of the habitat types 'landscape' and 'water body' received a weight of 1 to 4, while the attributes of the habitat type 'microhabitat' received a weight of 1 to 3 (Appendix A2). The increase in weights indicated an increase in impact the stressors may have on the presence of dragonflies for each specific attribute. Thus, a weight of 1 indicates that the stressors will have minimal to no impact on the presence of dragonflies, while a weight of 4 (or 3 in the case of the habitat category 'microhabitat') indicates that the stressors have a severe impact on the presence of dragonflies.

The next step was to multiply the above weights that were given to each of the 27 attributes with the relevant value of the specific attributes (indication of preference), which was provided by the specialists. This offered a weighted attribute-sensitivity value for each attribute of each habitat type, i.e. a total of 27 weighted sensitivity values for each species. For example: if the attribute 'forested landscape' (code 'Fx' in Appendix A2) of a species was given a specialists' value of 3 (the absolutely preferred landscape) while the weight of this attribute is 4 (e.g. complete deforestation can wipe out the species' population), the weighted sensitivity of this attribute for the species will be 12. Consequently, deforestation will have a severe impact on a specific dragonfly

species' presence in a forested area. These calculations were done for each of the 27 attributes for each of the 708 species.

For step three, the weighted attribute-sensitivity values of the particular main habitat types were added together to provide the 'Total Weighted Attribute Sensitivity' (TWAS) for each species, i.e. each species had three respective TWAS values, one for each habitat type. Also, the valued attributes (indication of preference) of the respective main habitat types, as given by the specialists, were added together to provide the 'Total Habitat Width' (THW) for each species, i.e. each species had three respective THW values. To determine how sensitive each habitat type may be to the impacts of the stressors, the TWAS was divided by the THW of the respective habitat types for each species. As a result, each of the 708 species now had one habitat sensitivity value for each of the three main habitat types, which ranged from 1 to 4 for the habitat types 'landscape' and 'water body', and in the case of the habitat type 'microhabitat', from 0 to 3.

However, these values were fractions, and had to be converted to single values. Therefore, the next step was to convert the fragmented habitat sensitivity values for each of the three habitat categories into one habitat sensitivity value for each habitat type, for each dragonfly species. This was done by using the IF function in Microsoft Excel, i.e. a function that checks whether a certain value or condition is met and returns a specific value if this condition is true. As there are three habitat types and one of them has a different value range regarding its habitat sensitivity, two distinct IF functions with their relevant ranges were created. These functions were as follows:

- Landscape and water body sensitivity = IF(value ≤ 1.9, 0, IF(value ≤ 2.9, 1, IF(value ≤ 3.9, 2, IF(value ≥ 4.0, 3))))
- Microhabitat sensitivity = IF(value ≤ 0.9, 0, IF(value ≤ 1.9, 1, IF(value ≤ 2.9, 2, IF(value ≥ 3.0, 3))))

Consequently, each dragonfly species now had three types of distinct habitat sensitivity to anthropogenic disturbance values, i.e. landscape sensitivity, water body sensitivity and microhabitat sensitivity. These three sensitivity values were added together to provide a total habitat sensitivity value, ranging from 0 to 9, for each of the 708 dragonfly species. However, like the other two sub-indices of the ADBI, the species vulnerability sub-index scores need to range from 0 to 3. To determine this value range, each of these total habitat sensitivity values was converted to a species vulnerability sub-index score by using another IF function. This IF function was as follows:

- Species Vulnerability sub-index = IF(value = 0, 0, IF(value = 1, 0, IF(value = 2, 0, IF(value = 3, 1, IF(value = 4, 1, IF(value = 5, 2, IF(value = 6, 2, IF(value ≥ 7, 3)))))))

The following numerical ranges were used to determine the sub-index scores 0 to 3: species with a total habitat sensitivity value of 0-2 received a score of 0; species with a total habitat sensitivity value of 3-4 received a score of 1; species with a total habitat sensitivity value of 5-6 received a score of 2; and species with a total habitat sensitivity value of ≥ 7 received a score of 3.

Hence, the species vulnerability sub-index scores were as follows: species with a score of 0 are not vulnerable to any anthropogenic disturbances (all habitat types can be disturbed), species with a score of 1 show some vulnerability to anthropogenic disturbances (two habitat types can be disturbed), species with a score of 2 are vulnerable to anthropogenic disturbances (one habitat type can be disturbed), and species with a score of 3 are extremely vulnerable to anthropogenic disturbances (no habitat types can be disturbed) (Table 2.1).

2.3 Separating feasible species from species that are pending

A total of 708 recorded dragonfly species are recognized for the African continent (as listed in the ADHM). However, after completing all the calculations for the three sub-indices, it was found that not all of these species had adequate data for the three sub-indices to create satisfactory ADBI scores. Thus, the species without the necessary data are listed as 'pending, requiring further data'. To determine which of these species should be classified as 'pending', there are three categories that separated them from the 'feasible species' (i.e. those that had adequate data to create ADBI scores).

These categories are as follows: 1) species within the ADHM that to date have no recorded geographical distribution listed in the ODA (e.g. *Trithemis morrisoni*); 2) species which have a recorded distribution of three or less observations in the ODA (e.g. *Idomacromia jillianae*); and 3) species within the ADHM that have inadequate information to provide a relatively accurate description of their habitat width, i.e. there is not enough information available to successfully evaluate the habitat attributes (e.g. *Micromacromia flava*). The result of this culling meant that of the 708 species, 104 had to be classified as pending. Therefore, only 604 feasible species (115 269 ODA records) received an ADBI score. These species with their three sub-index scores and final ADBI scores are listed in Appendix A3.

Table 2.1. Description of the three sub-indices of the African Dragonfly Biotic Index (ADBI), i.e. 1) Geographical Distribution, 2) Threat Status and 3) Species Vulnerability to anthropogenic disturbances. The scores of these three sub-indices range from 0 to 3, with the total ADBI score being the sum of the scores of the three sub-indices ranging from 0 to 9. Thus, a common, widespread, non-threatened and highly-tolerant (of anthropogenic disturbances) species would receive a score of 0 (0 + 0 + 0), whereas a highly restricted, endangered and extremely sensitive species would be scored a 9 (3 + 3 + 3). Abbreviations for the IUCN/SSC species threat status (IUCN 2016): LC – Least Concern, NT – Near Threatened, DD – Data Deficient, VU – Vulnerable, EN – Endangered and CR – Critically Endangered. Other abbreviations: lat-long – latitude-longitude.

Scores	Sub-indices		
	Geographical Distribution	**Threat Status**	**Species Vulnerability**
0	A very wide distribution range size (species have a lat-long range size of more than 50° of continental Africa)	LC	Low vulnerability to certain anthropogenic disturbances (all 3 habitat types* are disturbed)
1	A wide distribution range size (species have a lat-long range size between 25° and 50° of continental Africa)	NT, DD	Shows some vulnerability to certain anthropogenic disturbances (2 habitat types* are disturbed)
2	A narrow distribution range size (species have a lat-long range size between 5° and 25° of continental Africa)	VU	Is vulnerable to certain anthropogenic disturbances (1 habitat type* is disturbed)
3	A very narrow distribution range size (species have a lat-long range size of less than 5° of continental Africa)	EN, CR	Extremely vulnerable to certain anthropogenic disturbances (no habitat type* is disturbed)

*The habitat types include the occurrence of landscape, water bodies and microhabitats.

2.4 Data analyses

All the relevant data analyses and maps were completed using the 604 species for which the three sub-indices and ADBI scores could be calculated. The data were comparatively analysed (e.g. calculating frequency and Spearman Rank Correlation) using STATISTICA version 13 (Dell Inc. 2016). The maps were created using the programme ArcGIS version 10.0 (ESRI 2010). Furthermore, to illustrate the diversity of the species across the African continent, the maps were prepared according to the terrestrial ecoregions of Africa, as established by The Nature Conservancy (2013). Only the 105 terrestrial ecoregions which encompass the African continent were used, i.e. all the terrestrial ecoregions which represent the islands that occur around the continent (e.g. Madagascar, Seychelles, Mauritius, etc.) were excluded. A map illustrating the different terrestrial ecoregions as well as a list of these regions' eco-codes with their relevant eco-names are shown in Appendix A4.

3. RESULTS

3.1 The three sub-indices of the ADBI

Of the 604 dragonfly species that could be assessed, 47% are classified to have a narrow distribution range (i.e. have a latitude-longitude range size between 5° and 25° of continental Africa) and were assigned the sub-index score 2 (Table 2.2). Thus, these 285 species occur within a 20° band width, either north or south of the equator. Also, of the assessed dragonflies, only 78 species occur within a very narrow distribution band of 5° or less and were assigned the sub-index score 3 (Table 2.2). As there is sufficient information available on the global threat status of the assessed dragonfly species, ≥80% are classified as of 'Least Concern' by the IUCN (2016), i.e. 531 species were given the sub-index score 0 (Table 2.2). Furthermore, as the level of threat increases, so then does the numbers of these species decrease per sub-index score. Thus, 35 species are classified as 'Near Threatened' or 'Data Deficient' (sub-index score 1), 19 species as 'Vulnerable' (sub-index score 2), and 19 species are classified as 'Endangered' or 'Critically Endangered' (sub-index score 3) (Table 2.2).

Regarding the third sub-index, species vulnerability to anthropogenic disturbances, more than a third of the 604 dragonfly species (261 species) showed some vulnerability to anthropogenic disturbances as expressed by their habitat classifications (i.e. two habitat types can be disturbed) and were assigned the sub-index score 1 (Table 2.2). It is therefore possible to find some of the species within this group in artificial water bodies, such as dams and reservoirs, e.g. *Anax imperator*, *Brachythemis leucosticta* and *Crocothemis erythraea*. On the other hand, only 66 species

are classified to have no vulnerability to any anthropogenic disturbances, i.e. were assigned sub-index score 0 (Table 2.2). The species within this group can occur in heavily disturbed or man-made habitats, e.g. individuals of *Acisoma trifidum* have been found in mining pits in heavily disturbed forests. As a final point, 51 of the assessed species are restricted to naturally undisturbed areas and were assigned the sub-index score 3 (Table 2.2). An example is *Spesbona angusta*, which has been only recorded within a small area and at an elevation of about 400 m in the Western Cape Province of South Africa.

It was also necessary to determine whether the three sub-indices have a relatively good enough relationship with each other to be able to create practical ADBI scores. As the data of the three sub-indices are categorical and do not have a normal distribution (i.e. the Kolmogorov-Smirnov test of normality, for all three sub-indices, showed significant differences at $p<.01$), a non-parametric analysis, the Spearman Rank Correlation ($-0.7 \leq r \leq 0.7$), were used for the three sub-indices. Although the Spearman Rank Correlation is usually measured at $-1 \leq r \leq 1$, it is considered here that the correlation values (r-values) outside the range of $-0.7 \leq r \leq 0.7$ are highly significant. The correlations could therefore be divided into three groups, i.e. 1) strong correlations (r-values > ±0.6), moderate correlations (r-values ±0.4 – ±0.6), and 3) weak correlations (r-values < ±0.4). According to Spearman R, the three sub-indices were significant at $p<.05$ and thus, in accordance with the above groups, these sub-indices have moderate to weak correlations with each other. Hence: 1) distribution vs. threat status has a rank value of $r = 0.460$; 2) distribution vs. species vulnerability has a rank value of $r = 0.422$; and 3) threat status vs. species vulnerability has a rank value of $r = 0.237$. Therefore, although the three sub-indices are not independent from each other, the correlations are significantly weak enough for each sub-index to contribute to the creation of workable ADBI scores.

Table 2.2. Frequency of dragonfly species that were allocated the respective sub-index scores (i.e. 0 to 3) for each of the three African Dragonfly Biotic Index sub-indices, i.e. Geographical Distribution, Threat Status and Species Vulnerability to anthropogenic disturbances.

Scores	Sub-indices		
	Geographical Distribution	**Threat Status**	**Species Vulnerability**
0	93	531	66
1	148	35	261
2	285	19	226
3	78	19	51
Total	604	604	604

3.2 The ADBI scores

The dragonfly species that were assessed can be roughly compiled into two groups, i.e. generalists and specialists. The generalists have ADBI scores ranging from 0 to 4, with the ADBI becoming lower as species rankings become less vulnerable to anthropogenic disturbances (Fig. 2.3). In other words, dragonfly species with an ADBI score of 0 have a higher tolerance for disturbances to their habitats than species with a higher ADBI score. For example: *Trithemis arteriosa* (ADBI score 0; Appendix A3) is a widespread species, which is found from freshwater ponds and lakes to irrigation channels. On a global scale, this species has no known major threats, but it could decline locally from pollution and over-abstraction of water (Boudot *et al.* 2013).

On the other hand, species classified as specialists have ADBI scores ranging from 5 to 9, with the species becoming increasingly vulnerable to anthropogenic disturbances the higher their ADBI scores (Fig. 2.3). Thus, dragonfly species with an ADBI score of 9 have no tolerance for any anthropogenic disturbances and can only be found under fully natural environmental conditions. For example: *Amanipodagrion gilliesi* (ADBI score 9; Appendix A3), a damselfly only found in small enclosed forest streams, has a very restricted distribution range, i.e. occupies a very small area (≤10 km^2) located within the Sigi Forest in east Usambara Mountains in Tanzania. It is estimated that this species' population consists of <500 individuals, which is declining due to the area in which they occur being increasingly populated by humans with the accompanied consequences, i.e. forest destruction and pollution (Clausnitzer 2010).

Both the low ADBI scores (0 to 1) and high ADBI scores (8 to 9) have a relatively low number of species per score, i.e. ADBI score 0, 39 species; ADBI score 1, 60 species; and both ADBI scores 8 and 9 having only 9 species per score (Fig. 2.3). The peak number of species per score occurs at the average ADBI scores of 3 and 4 (Fig. 2.3). This spread in species across the ADBI scores is similar to the spread of South African species across the South African DBI scores, when the scores are plotted according to the South African incidence (Samways & Simaika 2016). Therefore, approximately a quarter of the assessed species were given an intermediate ADBI score of either 3, 156 species or 4, 145 species (Fig. 2.3).

The species with an ADBI score of 3 can be classified as follows: they have a wide to narrow distribution range (sub-index scores 1 and 2 respectively), are non-threatened (sub-index score 0), and show some vulnerability when being subject to anthropogenic disturbances (sub-index scores 1 and 2 respectively; Table 2.1). Examples are: *Macrodiplax cora*, *Palpopleura albifrons* and *Pseudagrion estesi* (Appendix A3). On the other hand, the species with an ADBI score of 4 vary more in their classifications. That is, these species have a distribution range that varies from wide to very narrow (sub-index scores 1 to 3), are non-threatened or near threatened (sub-index scores 0 and 1 respectively), and their vulnerability to anthropogenic disturbances varies from showing some

vulnerability to being extremely vulnerable to any changes in their habitats (sub-index scores 1 to 3; Table 2.1). Examples are: *Micromacromia zygoptera*, *Pinheyschna waterstoni* and *Chlorolestes conspicuus* (Appendix A3).

To determine the extent of the ADBI scores (0 to 9) across the African continent, the abundance of the ADBI scores (i.e. the number of recorded individuals per ADBI score) were plotted across the continent and are shown in ten different maps in Appendix A5. As shown in Figure 2.3, the number of species per ADBI score increases from ADBI scores 0 to 3 after which the number decreases. On the other hand, although the abundance of the species initially increases from ADBI score 0 (25 193 recorded individuals) to ADBI score 1 (38 852 recorded individuals), the species abundance decreases from ADBI score 2 (18 381 recorded individuals; Appendix A5). Also, as would be expected, the generalists (ADBI scores 0 to 4) occur in the majority of the continent's terrestrial ecoregions, i.e. species with: ADBI score 0 populates 99 ecoregions, ADBI score 1 populates 101 ecoregions, ADBI score 2 populates 90 ecoregions, ADBI score 3 populates 91 ecoregions, and ADBI score 4 populates 84 ecoregions (Appendix A5).

Likewise, as species become more specialized in their habitat requirements (ADBI scores 5 to 9), the number of ecoregions in which the species occur decreases, i.e. species with ADBI scores 8 and 9 populates 11 and 18 ecoregions respectively (Appendix A5). In addition, of the 105 terrestrial ecoregions, five of them are populated with all ten ADBI scores 0 to 9 (Appendix A5). These ecoregions are: Ethiopian Montane Forests (AT0112); Victoria Basin Forest-Savanna Mosaic (AT0721); Drakensberg Montane Grasslands, Woodlands and Forests (AT1004); Ethiopian Montane Grasslands and Woodlands (AT1007); and Montane Fynbos and Renosterveld (AT1203) (Appendix A4). Lastly, of the 105 terrestrial ecoregions, only three do not have any recorded presence of dragonfly species (Appendix 5). These ecoregions are: Western Zambezian Grasslands (AT0724); East Africa Halophytics (AT0901); and Eritreaen Coastal Desert (AT1304) (Appendix A4).

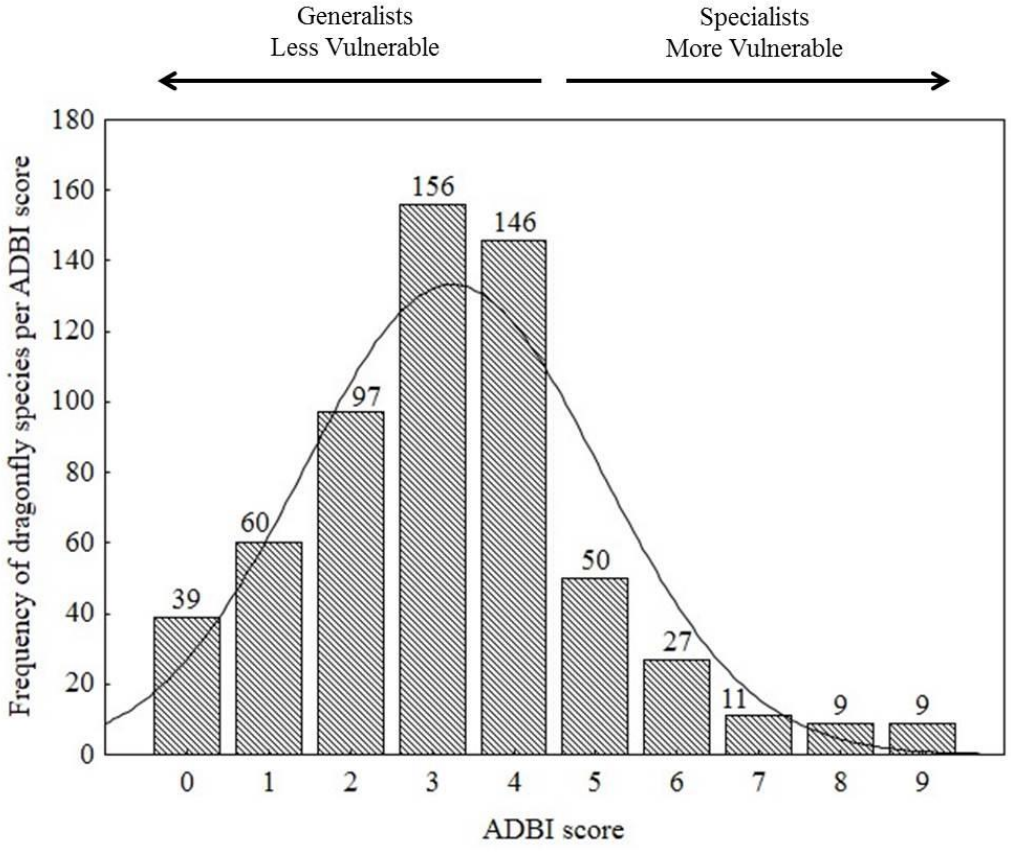


Figure 2.3. Frequency of dragonfly species (total = 604) that were allocated the respective African Dragonfly Biotic Index (ADBI) scores (i.e. 0 to 9). The species can be separated into two groups as regards to the ADBI scores, i.e. generalists (ADBI scores 0 to 4) and specialists (ADBI scores 5 to 9). The generalists are usually less vulnerable to anthropogenic disturbances the lower the ADBI scores, whereas the specialists increase in vulnerability as the ADBI scores increases.

3.3 Species diversity, level of threat and range restriction

The African continent can be divided into three zones regarding dragonfly species richness, i.e. northern Africa (desert and xeric shrubland), central Africa (tropical and sub-tropical vegetation) and southern Africa (desert and xeric shrubland). The most species-rich areas are the tropical and sub-tropical areas (≥80 recorded species within the ecoregions), which extends from Guinea and Angola on the Atlantic Ocean to Kenya and KwaZulu-Natal on the Indian Ocean side of Africa (Fig. 2.4). The terrestrial ecoregions with the highest number of species are the Northern Congolian Forest-Savanna Mosaic (AT0712) with 207 species; Western Congolian Forest-Savanna Mosaic (AT0723) with 261 species; and Central Zambezian Miombo Woodlands (AT0704) with 265 species (Fig. 2.4 and Appendix A4).

The number of species per terrestrial ecoregions decreases (≤50 species within the ecoregions) both north and south of the equator as the vegetation changes from tropical and sub-tropical to more semi-desert and desert areas (Fig. 2.4). Also, both the northernmost and southernmost tips of the continent have a slight increase in species numbers, i.e. the terrestrial ecoregion Mediterranean Woodlands and Forests (PA1214; the northernmost tip) has 64 recorded species, while the ecoregion Lowland Fynbos and Renosterveld (AT1202; the southernmost tip) is populated with 63 species (Fig. 2.4 and Appendix A4). The reason for this is that both these two areas have a more Mediterranean climate, which makes the habitats more suitable for dragonfly species than the adjacent xeric environments. Furthermore, the easternmost part of the African continent is also classified as desert and xeric shrublands with very low species richness, i.e. Ethiopian Xeric Grasslands and Shrublands (AT1305) with 16 species; Somali Montane Xeric Woodlands (AT1319) with 18 species; and Hobyo Grasslands and Shrublands (AT1307) with 10 species (Fig. 2.4 and Appendix A4).

As regards the number of records for a species (a rough surrogate for abundance, notwithstanding sampling effort), the areas with the highest abundance occur in the same areas where species richness is highest, i.e. ecoregions highlighted in dark orange have approximately 1 000 to 2 000 recorded individuals (e.g. Atlantic Equatorial Coastal Forests, AT0102, has over 150 recorded species with 1 769 recorded individuals) and those highlighted in dark red have from over 2 000 to over 9 000 recorded individuals (e.g. Western Congolian Forest-Savanna Mosaic, AT0723, has 261 species and 9 149 recorded individuals) (Fig. 2.5 and Appendix A4). Similarly, abundance is lower for the ecoregions in the desert and xeric shrubland areas (both to the north and south of the equator), e.g. ecoregion Succulent Karoo (AT1322) has 39 species and 160 recorded dragonfly individuals (Fig. 2.5 and Appendix A4). Furthermore, both the southernmost and northernmost tips of the continent have respectively intermediate to high species records, i.e. the ecoregion Lowland Fynbos and Renosterveld (AT1202) has 810 recorded individuals while the ecoregion

Mediterranean Woodlands and Forests (PA1214) has 4 745 recorded individuals (Fig. 2.5 and Appendix A4). Again, this is possibly due to the Mediterranean climate of these areas. The diversity of the dragonfly species (i.e. richness and abundance) that were assessed here show similar distribution across the African continent, as shown in Dijkstra *et al.* (2011) and Clausnitzer *et al.* (2012).

Regarding the spread of the species' threat status, 102 of the 105 terrestrial ecoregions are occupied by species with the threat status LC (Fig. 2.6). This range is represented by an ecoregion that has only one species, *Pseudagrion nubicum*, with the LC status (i.e. Itigi-Sumba Thicket, AT0708) to the ecoregion, Central Zambezian Miombo Woodlands (AT0704) that is occupied by 257 species with the LC threat status (Fig. 2.6 and Appendix A4). Similarly, the numbers of ecoregions decreases as the level of threat increases, i.e. 48 ecoregions have species with the threat status of NT, 28 with the threat status of VU, 20 with the threat status of EN and 14 with the threat status of CR (Fig. 2.7 a-d). Of the 105 ecoregions, only six are occupied by two species with the status EN, i.e. within the eastern and southern part of Africa (Fig. 2.7c). On the other hand, only one terrestrial ecoregion is occupied by two species that are classified with the status CR, i.e. Montane Fynbos and Renosterveld (AT1203), which is found in the southernmost tip of Africa (Fig. 2.7d and Appendix A4).

To determine which of the 604 dragonfly species have a range restriction according to the terrestrial ecoregions, the distribution range (i.e. species that have a very narrow distribution range, sub-index score 3) and threat status (i.e. EN and CR, sub-index score 3) of each species were taken into consideration. These species will therefore have an ADBI score of either 8 or 9, depending on the species vulnerability sub-index score. Of the assessed species, 18 have a range restriction according to the two sub-indices (Table 2.3 and Fig. 2.8). Of these 18 species, only one species (*Metacnemis valida*) is restricted to five ecoregions (i.e. KwaZulu-Cape Coastal Forest Mosaic, AT0116; Drakensberg Montane Grasslands, Woodlands and Forests, AT1004; Maputaland-Pondoland Bushveld and Thickets, AT1012; Albany Thickets, AT1201; Montane Fynbos and Renosterveld, AT1203), while five species (e.g. *Mesocnemis tisi* and *Orthetrum rubens*) are each restricted to just one ecoregion (Table 2.3). Also, of the 105 terrestrial ecoregions, 12 ecoregions are occupied by one of the range restricted species (highlighted in dark yellow), while one ecoregion is occupied by four range restricted species, i.e. Montane Fynbos and Renosterveld (AT1203), which is highlighted in red (Fig. 2.8).

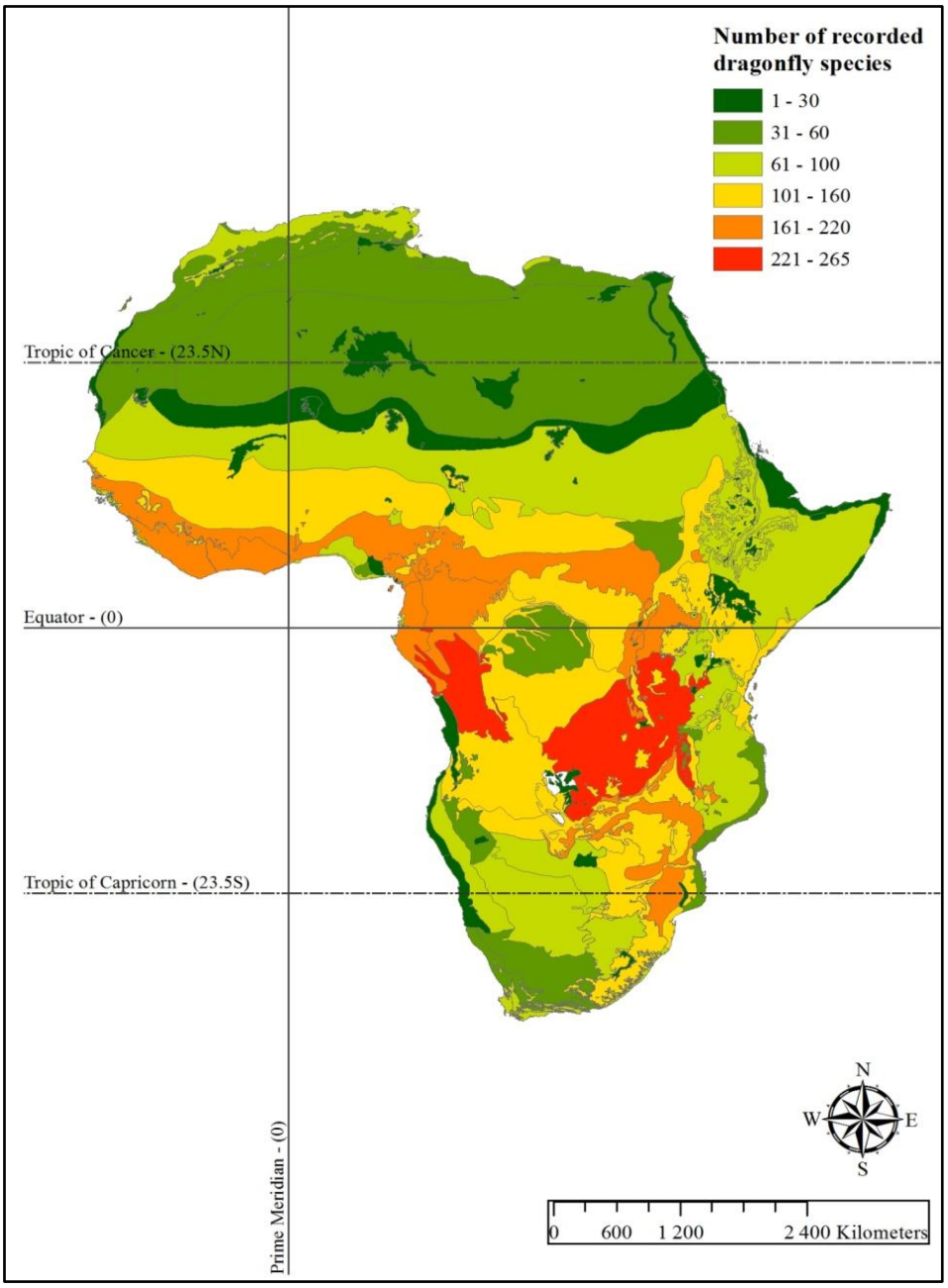


Figure 2.4. Extent of dragonfly species' richness according the terrestrial ecoregions as established by The Nature Conservancy (2013), across the African continent. The highest number of species is in the tropics and sub-tropics (indicated in dark orange and dark red) with the number of species decreasing as they move north and south respectively. The least number of species are recorded in the desert (e.g. Saharan – and Namib Desert) and semi-desert areas (e.g. Kalahari Desert and Nama Karoo), indicated in light to dark green.

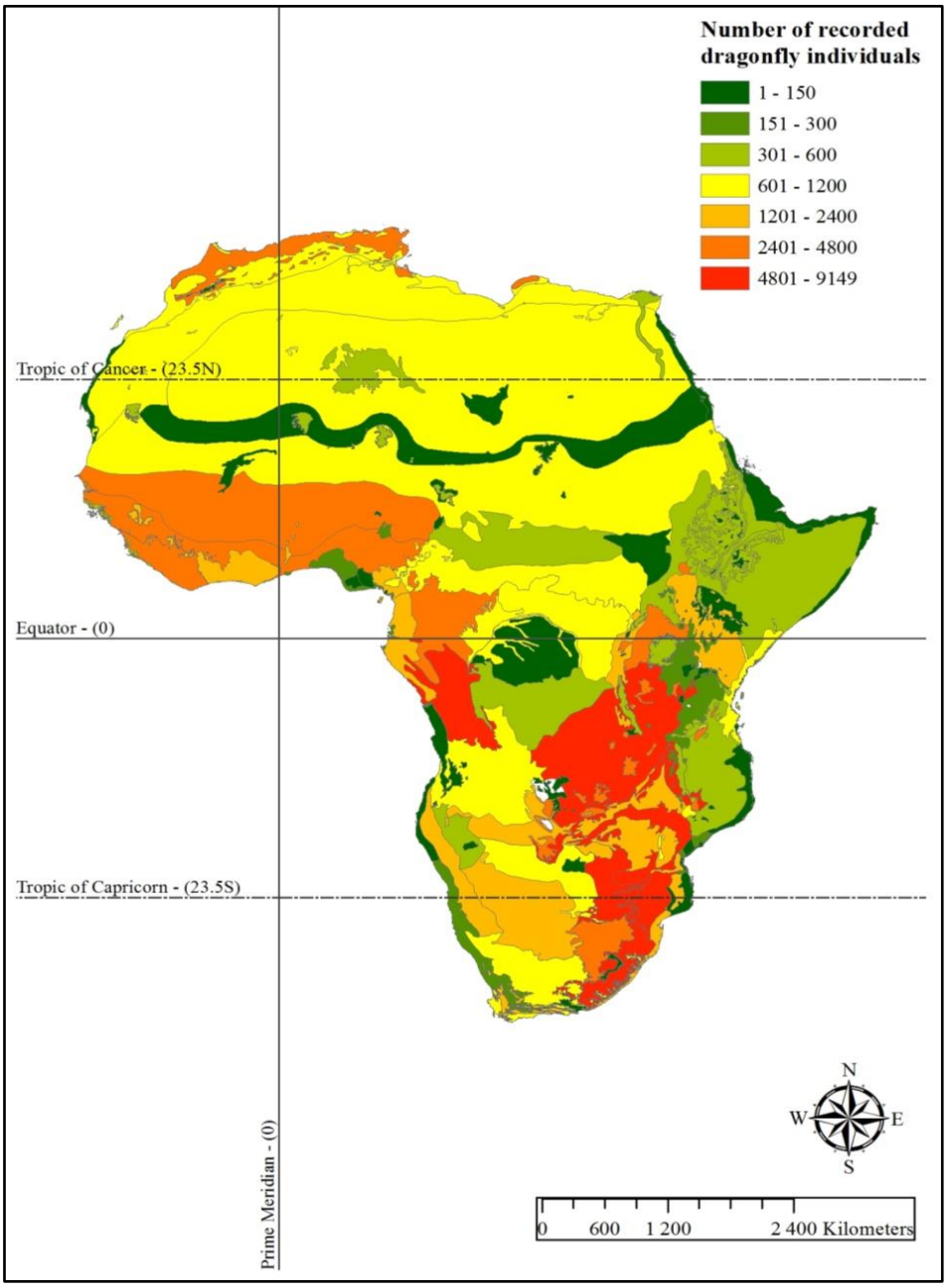


Figure 2.5. Of the 105 terrestrial ecoregions, 15 have a high number of recorded individuals for a species (a rough surrogate for abundance, notwithstanding sampling effort), i.e. from approximately 2 000 to over 9 000 recorded individuals, which is highlighted in dark red. Similarly 15 ecoregions have a low number of recorded individuals for a species (<30 recorded individuals, which is indicated in dark green). The highest number of recorded individuals occurs within the ecoregion Western Congolian Forest-Savanna Mosaic, eco-code AT0723 (Appendix A4).

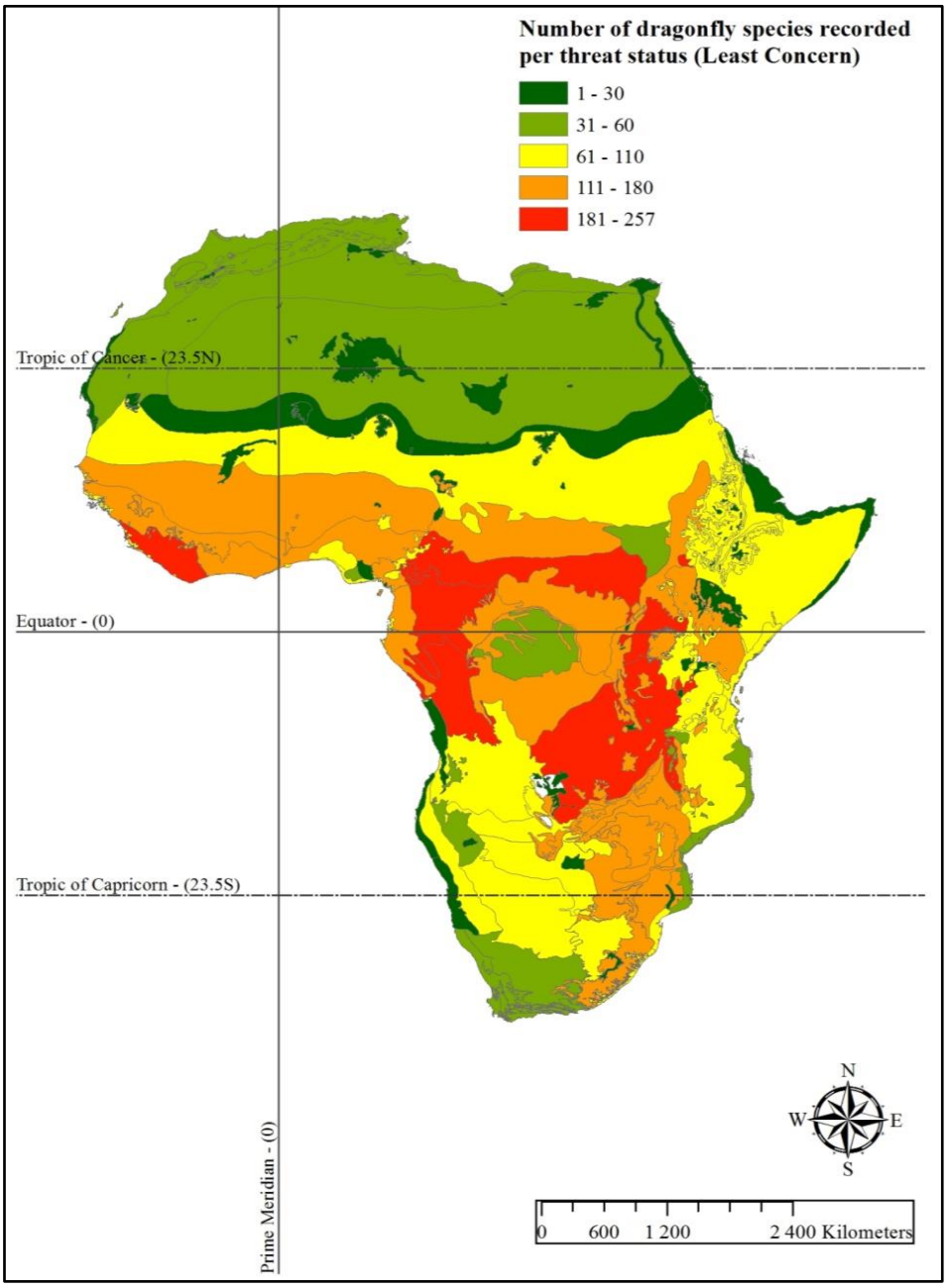


Figure 2.6. Number of dragonfly species recorded for the Red List threat status 'Least Concern' (LC) for each terrestrial ecoregion, as established by The Nature Conservancy (2013). A total of 102 of the 105 ecoregions are occupied by species with the LC status. Some of these ecoregions, such as Itigi-Sumba Thicket (AT0708), are occupied by one species with a LC status (dark green), whereas Central Zambezian Miombo Woodlands (AT0704) is occupied by 257 species with a LC status (red).

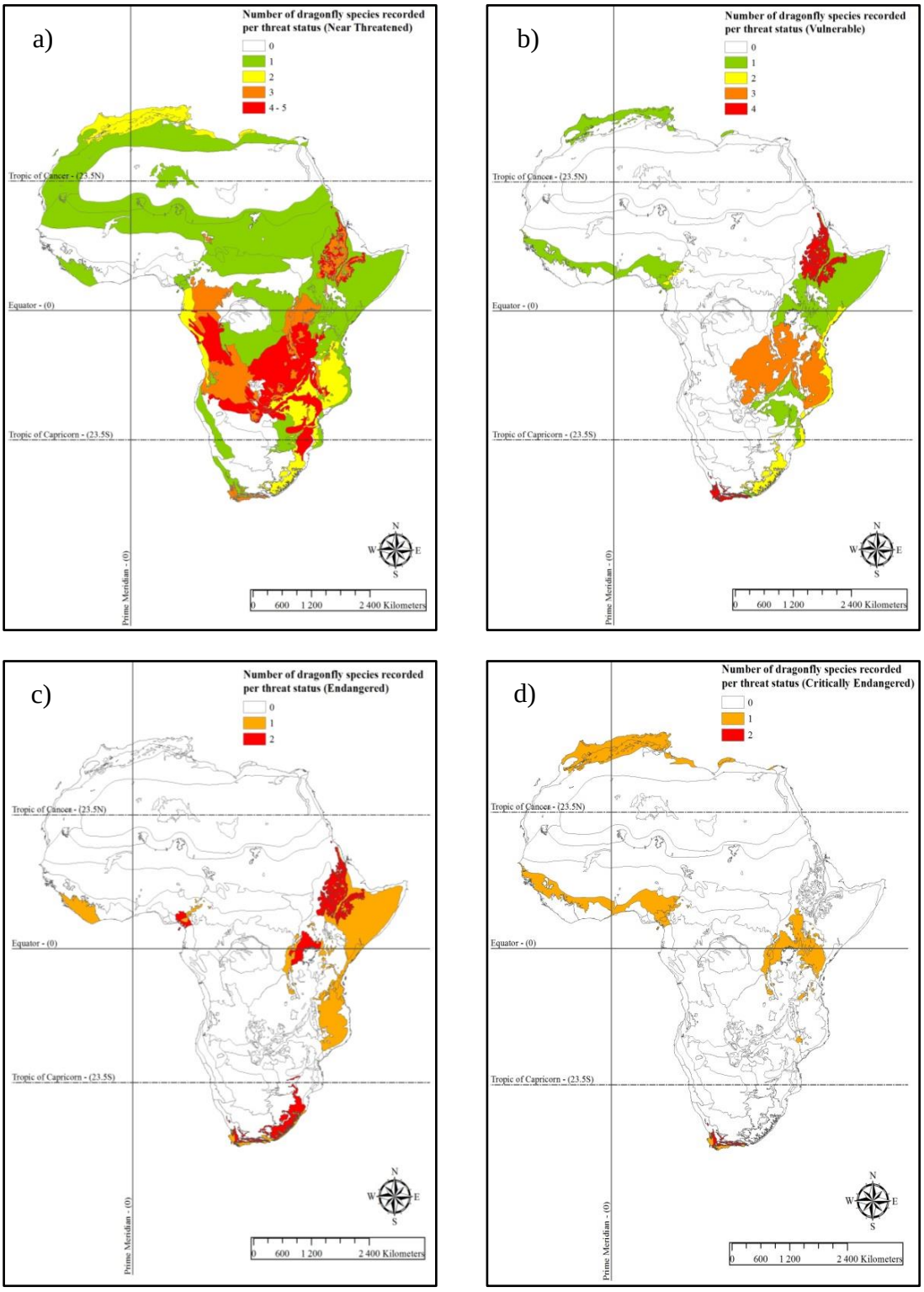


Figure 2.7. These four maps illustrate the number of dragonfly species recorded per terrestrial ecoregion for each Red List threat status, i.e. a) Near Threatened (NT), b) Vulnerable (VU), c) Endangered (EN) and d) Critically Endangered (CR). Six ecoregions have two species classified as Endangered (found within the eastern and southern part of Africa) whereas only one ecoregion has two species classified as Critically Endangered (Montane Fynbos and Renosterveld, AT1203).

Table 2.3. The 18 range restricted dragonfly species with their relevant global Red List (RL) categories (EN or CR) and African Dragonfly Biotic Index (ADBI) scores (8 or 9). Furthermore, all 18 species have a very narrow distribution range with a geographic distribution sub-index score of 3. Also included, are the relevant terrestrial ecoregions in which each of these species occurs.

Species	Global RL category	ADBI score	Terrestrial ecoregions
Agriocnemis palaeforma	EN	8	Albertine Rift Montane Forests; Victoria Basin Forest-Savanna Mosaic
Amanipodagrion gilliesi	CR	9	Eastern Arc Forests
Chlorolestes apricans	EN	8	Knysna-Amatole Montane Forests; Drakensberg Montane Grasslands, Woodlands and Forests
Mesocnemis tisi	EN	8	Western Guinean Lowland Forests
Metacnemis valida	EN	9	KwaZulu-Cape Coastal Forest Mosaic; Drakensberg Montane Grasslands, Woodlands and Forests; Maputaland-Pondoland Bushveld and Thickets; Albany Thickets; Montane Fynbos and Renosterveld
Neodythemis munyaga	CR	8	Albertine Rift Montane Forests; Victoria Basin Forest-Savanna Mosaic
Neurolestes nigeriensis	CR	9	Cameroonian Highlands Forests; Cross-Sanaga-Bioko Coastal Forests; Guinean Forest-Savanna Mosaic
Notogomphus cottarellii	EN	8	Ethiopian Montane Grasslands and Woodlands; Ethiopian Montane Forests
Notogomphus maathaiae	EN	9	East African Montane Forests; Victoria Basin Forest-Savanna Mosaic
Notogomphus ruppeli	EN	9	Ethiopian Montane Forests; Somali Acacia-Commiphora Bushlands and Thickets; Ethiopian Montane Grasslands and Woodlands; Ethiopian Montane Moorlands
Oreocnemis phoenix	CR	9	South Malawi Montane Forest-Grassland Mosaic

Table 2.3. *Continued*.

Species	Global RL category	ADBI score	Terrestrial ecoregions
Orthetrum rubens	CR	8	Montane Fynbos and Renosterveld
Platycypha amboniensis	CR	8	East African Montane Forests; Northern Acacia-Commiphora Bushlands and Thickets
Platycypha auripes	EN	9	Eastern Arc Forests; Northern Zanzibar-Inhambane Coastal Forest Mosaic; Eastern Miombo Woodlands
Proischnura polychromatica	EN	8	Lowland Fynbos and Renosterveld; Montane Fynbos and Renosterveld
Sapho puella	EN	9	Cross-Sanaga-Bioko Coastal Forests
Spesbona angusta	EN	8	Lowland Fynbos and Renosterveld; Montane Fynbos and Renosterveld
Umma mesumbei	EN	9	Cameroonian Highlands Forests; Cross-Sanaga-Bioko Coastal Forests

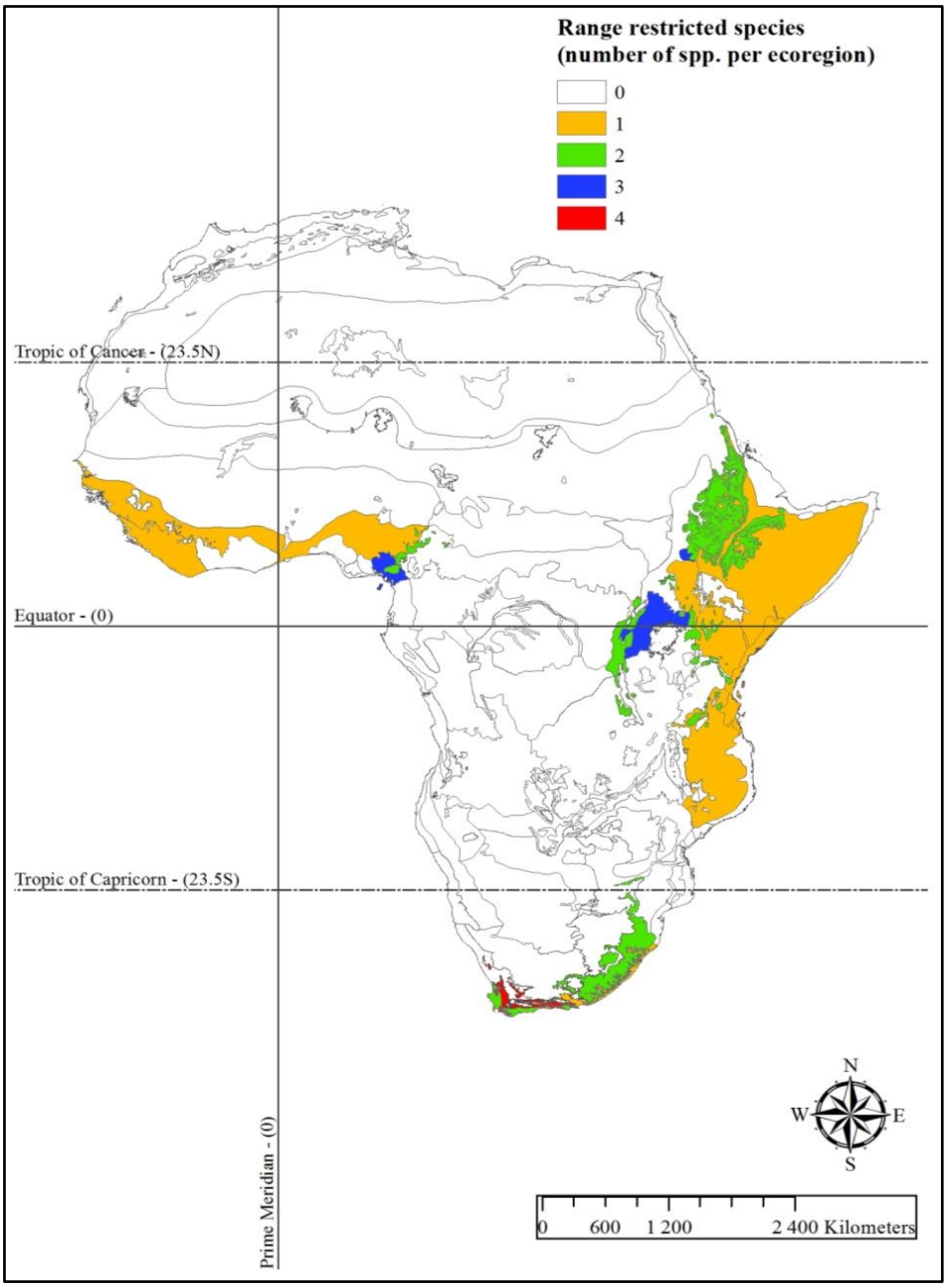


Figure 2.8. There are 18 dragonfly species that have a very restricted distribution range and are classified as highly threatened (i.e. Endangered or Critically Endangered according to the Red List threat status). Both of these sub-indices are scored 3 according to the ADBI sub-index descriptions. This map illustrates the range restriction of these 18 species according to the terrestrial ecoregions, as established by The Nature Conservancy (2013). Of the 105 ecoregions, 12 have one range restricted species while one ecoregion is occupied by four range restricted dragonfly species (Montane Fynbos and Renosterveld, AT1203).

4. DISCUSSION

4.1 Calculating the Geographic Distribution sub-index: using the species' range sizes

For many years, the extent of occurrence (EOO) concept, as defined by the IUCN guidelines (IUCN 2016), was used to define the estimated area or spatial spread in which an organism is enclosed (e.g. Cumberlidge & Daniels 2008; Darwall *et al.* 2009; Suhling *et al.* 2009). According to the IUCN guidelines (IUCN 2016), the main recommendation is the use of a range-estimation method, the minimum convex polygon (MCP), to express the EOO of the relevant organisms (Burgman & Fox 2003). However, according to Simaika and Samways (2010), using MCP range estimations can be problematic as it is at too coarse a scale, can over-estimate the potential range in which the species may occur, and it needs at least three documented presence records to determine the spread of a species. Consequently, using minimum convex polygons to estimate the spatial spread of aquatic organisms is not recommended as it can be extremely misrepresentative of species spread (Simaika & Samways 2010).

As with the South African DBI, the ADBI relies on the presence/absence data of adult dragonflies to calculate the geographic distribution sub-index. However, unlike the South African DBI, which, for practical reasons, calculated the first sub-index according to the species' presence/absence records in the South African provinces (Samways & Simaika 2016), the geographic distribution sub-index of the ADBI had to be calculated at a larger, continental scale. This presented a problem, as the DBI method could not be applied at a continental level due to the fact that provinces or countries are delineated by boundaries that are governed by political decrees. Dragonflies, on the other hand, are highly mobile animals that do not recognise these human boundaries and will occupy areas according to their habitat preferences.

In fact, of the 604 species that were assessed, only 74 species are found within the particular borders of any one African country, e.g. *Ischnura abyssinica* (Ethiopia), *Crenigomphus kavangoensis* (Namibia) and *Libellula quadrimaculata* (Morocco). Therefore, a new method for calculating the geographic distribution sub-index was needed. It was decided to base the calculations on the range size (i.e. calculating the area between the outermost limits of each species' distribution range) as a method to assess each species extent within the African continent. In other words, the latitudinal extent of a species' geographical range was examined (i.e. Gaston & Blackburn 2000). In this study, the ultimate distance of each species' latitudinal extent was measured against the longitudinal extent of their geographical range. Although this method is robust, it provided a good description of each assessed species' geographical range.

4.2 Evaluating the species ranges: using terrestrial ecoregions

The main focus of biodiversity conservation is to maintain species diversity as well as to preserve distinct ecosystems and ecological processes. This conservation action usually occurs at country levels, but ecological processes, as well as patterns of biodiversity, do not coincide with the political boundaries of countries. However, a possible alternative is ecoregions, which can act as units for conservation purposes. The Global 200 was created by Olsen and Dinerstein (1998), which is a broad biogeographical classification of the world's ecoregions according to the three main regions, terrestrial, freshwater and marine. Ecoregions are defined as units of land or water that consist of distinct assemblages natural communities that share similar species, environmental conditions and ecological dynamics, and which are also cordoned off by boundaries that estimate the original area of the natural communities that may have existed before major human modifications (Olsen & Dinerstein 1998, 2002; Olson *et al.* 2001). These ecoregions are likewise subjected to several physical influences such as local climatic conditions, topography and historical traits that may have also given rise to the current diversity patterns found within the natural assemblages.

The diversity of vegetation can correlate with the diversity of invertebrates (Panzer & Schwartz 1998; Olson *et al.* 2001) and that terrestrial ecoregions in particular can indicate the presence of dragonflies within these regions (e.g. Clausnitzer *et al.* 2009). Samways and Simaika (2016) have also confirmed that dragonflies are related to specific vegetation communities (i.e. forested landscapes will have different sets of dragonfly species than, for example, more open, grassland landscapes) and that, in particular, historical traits did not have just an effect on the species types, but also on their form. They assigned the presence/absence records of the South African dragonfly species to the 31 terrestrial ecoregions of South Africa when creating the South African DBI (Samways & Simaika 2016). This may assists with locating any dragonfly species, according to its ecological and biogeographical predisposition, within an overall geographical area in South Africa. This pattern in dragonfly preferences was also observed during the workshop when the ADHM was assessed by the dragonfly experts.

Additionally, freshwater ecoregions were not used as they cover whole catchments (i.e. from the feeder streams all the way to the lower reaches), which is too broad a classification to determine where a dragonfly species might occur (Simaika & Samways 2010; Samways & Simaika 2016). It has been in fact demonstrated that using *catchments* (i.e. Hydro 1K catchments), favoured by the IUCN as effective conservation units (Darwall *et al.* 2009), are predisposed to overestimate the distribution of dragonfly species and include large areas of land that do not represent the species' habitat requirements (Simaika & Samways 2010). Furthermore, it has been confirmed that dragonflies can act as surrogate species for other taxa such as certain amphibians, birds and

mammals, which is a combination of terrestrial and aquatic areas, the specific zone in which dragonflies move (Darwall *et al.* 2011).

In view of this, it is possible to scale the principles of the South African DBI up to a continent level (terrestrial ecoregions), which will help narrow searches at this large spatial scale (e.g. Simaika *et al.* 2013). It can also assist with the conservation of dragonflies and thus freshwater ecosystems at this large spatial scale, as most protected areas are selected according to best possible collation of terrestrial biodiversity (Simaika *et al.* 2013). Lastly, as dragonflies can act as surrogates for other taxa (e.g. Darwall *et al.* 2011) it is also possible that they are included within the conservation units, i.e. terrestrial ecoregions. However, there is an important rider here and that is the use terrestrial ecoregions must not be the sole search approach, as some species have highly disjointed distributions. A really good example is the disjunct distribution of the rare *Syncordulia gracilis*, which occurs in the Western Cape, Eastern Cape and with an early record, from KwaZulu-Natal, all of which are different ecoregions (Samways 2006, 2010; Samways & Simaika 2016).

4.3 Influences of Species Vulnerability sub-index scores on final ADBI scores

Calculating the scores of the ADBI's first two sub-indices, geographical distribution and threat status, were straight forward. In contrast, the calculations for the species vulnerability sub-index was elaborate and to a degree, subjective. The weights that were given to each attribute of the three main habitat types, to express the possible influence of the selected stressors on the dragonfly species' habitats, were partial to the supposition of how each of the three main stressors may negatively affect the presence of these species in a particular attribute. Whether these negative effects do apply to particular species, is not always quantified and thus, mostly assumed.

The type of stressors also had an effect on how the weights were given, e.g. deforestation would be most severe for forested areas while the growth of alien riparian trees would be critical for open, bare landscapes. Likewise, the scale of the weights also differed for the three main habitat types. As in the case of the category 'landscape', only one weight of '4' could be assigned to an attribute (i.e. had only four attributes) whereas the category 'water body' could be assigned more than one weight of '4' for its attributes (i.e. comprised of 12 attributes). The reason for this was that the number of weights (i.e. the number of "fours", "threes", etc.) that were assigned to the respective attributes did have an effect on the initial calculations from habitat width to habitat sensitivity. Therefore, these sub-index scores may be more restrained than for the other two sub-indices and thus, this third sub-index would have had an impact on the final ADBI scores for each of the assessed dragonfly species.

The main focus of calculating this sub-index was on the preferences of the dragonfly species regarding habitat types (i.e. their physical world) and how through human modifications their

presence within these habitats can be negatively affected. As discussed by Parmesan (2006), Butchart *et al.* (2010) and Pereira *et al.* (2010) the world is constantly being altered, which is causing biodiversity loss and the modification of the natural ecosystems. This is causing the natural communities to become more homogenized, i.e. specialist species will be gradually replaced by those that are more widespread, i.e. generalist species (McKinney & Lockwood 1999; Olden *et al.* 2004; Olden 2006). Thus, looking only at the physical habitats of the dragonfly species may cause some problems in future calculations of the ADBI, particularly when national indices are calculated.

A possible solution is to also include the characteristics or functional traits of the dragonfly species (both larval and adult) when calculating future ADBI scores, especially when national ADBI's are being calculated. An example is a study conducted by Eskildsen *et al.* (2015), which looked at the different functional traits (e.g. migratory behaviour) of Danish butterflies and whether these traits can indicate differences in the species richness and their assemblage compositions over time. They determined that the group structures and species richness of these butterflies are related to multiple functional traits of the butterflies, and that it is necessary to take the different aspects of ecological specialization into consideration when assessing possible extinction risks within an area. Another possible feature that can also be considered when calculating the third sub-index of the ADBI is the adaptive capacity (both fundamental and intrinsic) of a species, i.e. the ability of a species to cope with effects of climate change via three essential components: a species' genetic diversity, behavioural adjustments and dispersal ability (e.g. Beever *et al.* 2016).

Thus, incorporating potential functional traits and adaptive capacity of the dragonfly species within the calculations of the ADBI can quite possibly remove the subjectiveness of using a weighted system to calculate species vulnerability to human modifications. However, this would require a lot more detailed information on dragonfly species for which the data, for some of them at least, are still lacking (e.g. those species that are classified as still pending due to, for example, having inadequate information to provide an accurate description of their habitat width – section 2.3). Nevertheless, this combination of habitat preferences, functional traits and adaptive capacity could improve future calculations of the ADBI, and this could also be applied at ecosystem levels, which can improve the conservation of these ecosystems.

4.4 Applying the ADBI

The use of dragonflies for freshwater monitoring has proved to be of value in many countries from South Africa (Samways & Simaika 2016) to Brazil (Dutra & De Marco 2015; Valente-Neto *et al.* 2016) and to Europe, i.e. Austria (Chovanec *et al.* 2015), Italy (Golfieri *et al.* 2016) and France/Switzerland (Rosset *et al.* 2013). Each of these regions has selected an approach that suits them, and with a focus mostly on either running or still waters. The DBI has widespread appeal as it

covers aspects (i.e. the three sub-indices) that have wide applicability. But as shown here, this index does depend on having data on the range of anthropogenic disturbances, which each species has been recorded to tolerate. This is not possible, due to the lack of data, when translated into the large continental scale, and so the development of a vulnerability sub-index (as opposed to the habitat sensitivity sub-index of the DBI) was necessary when addressing the whole of continental Africa.

The point is that each species' ADBI value is not fixed, especially as there could be a change in the IUCN Red List status and more importantly in its vulnerability to changes in its habitat. This means that that new regional, national, or local DBIs (according to the need and feasibility of conservation action) can be developed for these areas based on the principles of the DBI developed in South Africa. Indeed, with more data, there could be a translation of the species' Vulnerability Sub-indices into new regional, national or local Habitat Sub-indices, which are more objective (i.e. based on actual occurrences in variously disturbed water body types). This could already be done in some countries where there is already good data, such as some East African countries.

5. CONCLUSION

The ADBI is the first framework for understanding comparative threats at a continental level, i.e. it provides a broad perspective for understanding the vulnerability of a water-associated group to anthropogenic disturbances at a very large scale, helping us grasp the perspectives at this scale. As a framework, the ADBI has several functions, such as having the potential to serve as a starting point for the development of other national DBI's beyond that already developed for South Africa. As a means for monitoring changes over the continent in years to come, the ADBI also has the potential to help identify threats and sensitivities to freshwater ecosystems, which means that appropriate conservation action can be taken in the future. Overall, the ADBI is a useful assessment method for determining the quality of freshwater ecosystems of the African continent. However, while working with the ADBI, one thing to consider is that the ADBI scores for each dragonfly species can possibly change as more information is gathered, such as more distribution records or a change in IUCN Red List threat status. Also, the ADBI does not preclude the use and/or creation of other biomonitoring tools such as SASS. The ADBI was specifically created for the rapid assessment of the integrity of freshwater ecosystems, which might not always reflect accurate measurement of the health of the ecosystems, but this could be done with development of regional, national or local DBIs.

REFERENCES

Allan, J.D. and Flecker, A.S. 1993. Biodiversity conservation in running waters. *BioScience* **43**: 32-43.

Beever, E.A., O'Leary, J., Mengelt, C., West, J.M., Julius, S., Green, N., Magness, D., Petes, L., Stein, B., Nicotra, A.B., Hellmann, J.J., Robertson, A.L., Staudinger, M.D., Rosenberg, A.A., Babij, E., Brennan, J., Schuurman, G.W. and Hofmann, G.E. 2016. Improving conservation outcomes with a new paradigm for understanding species' fundamental and realized adaptive capacity. *Conservation Letters* **9**: 131-137.

Boudot, J.-P., Clausnitzer, V., Samraoui, B., Suhling, F., Dijkstra, K.-D.B. and Schneider, W. 2013. *Trithemis arteriosa*. *The IUCN Red List of Threatened Species 2013*: e.T60053A13383194. http://dx.doi.org/10.2305/IUCN.UK.2013-1.RLTS.T60053A13383194.en.

Brown, J.H. 1995. *Macroecology*. The University of Chicago Press, Chicago, IL.

Burgman, M.A. and Fox, J.C. 2003. Bias in species range estimates from minimum convex polygons: implications for conservation and options for improved planning. *Animal Conservation* **6**: 19-28.

Butchart, S.H.M., Walpole, M., Collen, B., Van Strien, A., Scharlemann, J.P.W., Almond, R.E.A., Baillie, J.E.M., Bomhard, B., Brown, C., Bruno, J., Carpenter, K.E., Carr, G.M., Chanson, J., Chenery, A.M., Csirke, J., Davidson, N.C., Dentener, F., Foster, M., Galli, A., Galloway, J.N., Genovesi, P., Gregory, R.D., Hockings, M., Kapos, V., Lamarque, J.-F., Leverington, F., Loh, J., McGeoch, M.A., McRae, L., Minasyan, A., Hernández Morcillo, M., Oldfield, T.E.E., Pauly, D., Quader, S., Revenga, C., Sauer, J.R., Skolnik, B., Spear, D., Stanwell-Smith, D., Stuart, S.N., Symes, A., Tierney, M., Tyrrell, T.D., Vié, J.-C. and Watson, R. 2010. Global biodiversity: Indicators of recent declines. *Science* **28**: 1164-1168.

Carpenter, S.R., Stanley, E.H. and Vander Zanden, M.J. 2011. State of the World's freshwater ecosystems: physical, chemical, and biological changes. *Annual Review of Environment and Resources* **36**: 75-99.

Chovanec, A. 2000. Dragonflies (Insecta: Odonata) as indicators of the ecological integrity of aquatic systems – a new assessment approach. *Verhandlungen des Internationalen Verein Limnologie* **27**: 887-890.

Chovanec, A., Schindler, M., Waringer, J. and Wimmer, R. 2015. The Dragonfly Association Index (Insecta: Odonata) – A tool for the type-specific assessment of lowland rivers. *River Research and Applications* **31**: 627-638.

Chutter, F.M. 1994. The rapid biological assessment of streams and river water quality by means of macroinvertebrate communities in South Africa. In: M.C. Uys (ed.), *Classification of Rivers*

and Environmental Health Indicators, pp. 217-234. Water Research Commission Report No. TT 63/94, South Africa.

Clausnitzer, V. 2010. *Amanipodagrion gilliesi*. *The IUCN Red List of Threatened Species 2010*: e.T984A13100344. http://dx.doi.org/10.2305/IUCN.UK.2010-3.RLTS.T984A13100344.en.

Clausnitzer, V., Dijkstra, K.-D.B., Koch, R., Boudot, J.-P., Darwall, W.R.T., Kipping, J., Samraoui, B., Samways, M.J., Simaika, J.P. and Suhling, F. 2012. Focus on African freshwaters: hotspots of dragonfly diversity and conservation concerns. *Frontiers in Ecology and the Environment* **10**: 129-134.

Clausnitzer, V., Kalkman, V.J., Ram, M., Collen, B., Baillie, J.E.M., Bedjanič, M., Darwall, W.R.T., Dijkstra, K.-D.B., Dow, R., Hawking, J., Karube, H., Malikova, E., Paulson, D., Schütte, K., Suhling, F., Villanueva, R.J., Von Ellenrieder, N. and Wilson, K. 2009. Odonata enter the biodiversity crisis debate: The first global assessment of an insect group. *Biological Conservation* **142**: 1864-1869.

Corbet, P.S. 1999. *Dragonflies: Behaviour and Ecology of Odonata*. Harley Books, Colchester, UK.

Cumberlidge, N. and Daniels, S.R. 2008. A conservation assessment of the freshwater crabs of southern Africa (Brachyura: Potamonautidae). *African Journal of Ecology* **46**: 74-79.

Darwall, W.R.T., Smith, K.G., Allen, D.J., Holland, R.A., Harrison, I.J. and Brooks, E.G.E. (eds.). 2011. *The Diversity of Life in African Freshwaters: Under Water, Under Threat. An analysis of the status and distribution of freshwater species throughout mainland Africa.* IUCN, Cambridge, UK and Gland, Switzerland.

Darwall, W.R.T, Smith, K.G., Tweddle, D. and Skelton, P. (eds.). 2009. *The Status and Distribution of Freshwater Biodiversity in Southern Africa*. IUCN, Gland, Switzerland and SAIAB, Grahamstown, South Africa.

Dell Inc. 2016. *Dell STATISTICA (data analysis software system)*, version 13. www.statsoft.com.

Dickens, C.W.S. and Graham, P.M. 2002. The South African Scoring System (SASS) Version 5 Rapid Bioassessment Method for Rivers. *African Journal of Aquatic Science* **27**: 1-10.

Dijkstra, K.-D.B., Boudot, J.-P., Clausnitzer, V., Kipping, J., Kisakye, J.J., Ogbogu, S.S., Samraoui, B., Samways, M.J., Schütte, K., Simaika, J.P., Suhling, F. and Tchibozo, S.L. 2011. Dragonflies and damselflies of Africa (Odonata): history, diversity, distribution, and conservation. In: W.R.T Darwall, K.G. Smith, D.J. Allen, R.A. Holland, I.J. Harrison and E.G.E Brooks (eds.), *The Diversity of Life in African Freshwaters: Under Water, Under Threat. An analysis of the status and distribution of freshwater species throughout mainland Africa*, pp. 126-177. IUCN, Cambridge, UK and Gland, Switzerland.

Dudgeon, D., Arthington, A.H., Gessner, M.O., Kawabata, Z.-I., Knowler, D.J., Lévêque, C., Naiman, R.J., Prieur-Richard, A.-H., Soto, D., Stiassny, M.L.J. and Sullivan, C.A. 2006. Freshwater biodiversity: importance, threats, status and conservation challenges. *Biological Reviews* **81**: 163-182.

Dudgeon, D., Paugy, D., Lévêque, C., Rebelo, L.-M. and McCartney, M.P. 2011. Background. In: W.R.T Darwall, K.G. Smith, D.J. Allen, R.A. Holland, I.J. Harrison and E.G.E Brooks (eds.), *The Diversity of Life in African Freshwaters: Under Water, Under Threat. An analysis of the status and distribution of freshwater species throughout mainland Africa*, pp. 126-177. IUCN, Cambridge, UK and Gland, Switzerland.

Dutra, S. and De Marco, P. 2015. Bionomic differences in odonates and their influence on the efficiency of indicator species of environmental quality. *Ecological Indicators* **49**: 132-142.

Eskildsen, A., Carvalheiro, L.G., Kissling, W.D., Biesmeijer, J.C., Schweiger, O. and Høye, T.T. 2015. Ecological specialization matters: long-term trends in butterfly species richness and assemblage composition depend on multiple functional traits. *Diversity and Distributions* **21**: 792-802.

ESRI (Environmental Systems Resource Institute). 2010. *ArcMap 10.0*. ESRI Inc., Redlands, California, USA.

Gaston, K.J. and Blackburn, T.M. 2000. *Pattern and Process in Macroecology*. Blackwell Science, Oxford, UK.

Golfieri, B., Hardersen, S., Maiolini, B. and Surian, N. 2016. Odonates as indicators of the ecological integrity of the river corridor: Development and application of the Odonate River Index (ORI) in northern Italy. *Ecological Indicators* **61**: 234-247.

IUCN (International Union for Conservation of Nature and Natural Resources). 2016. *IUCN Red List Categories and Criteria: Version 3.1*. Second edition. IUCN, Gland, Switzerland and Cambridge, UK.

Jackson, R.B., Carpenter, S.R., Dahm, C.N., McKnight, D.M., Naiman, R.J., Postel, S.L. and Running, S.W. 2001. Water in a changing world. *Ecological Applications* **11**: 1027-1045.

Kipping, J., Dijkstra, K.-D.B., Clausnitzer, V., Suhling, F. and Schütte, K. 2009. Odonata Database of Africa (ODA). *Agrion* **13**: 20-23.

Kutcher, T.E. and Bried, J.T. 2014. Adult Odonata conservatism as an indicator of freshwater wetland condition. *Ecological Indicators* **38**: 31-39.

Malmqvist, B. and Rundle, S. 2002. Threats to the running water ecosystems of the world. *Environmental Conservation* **29**: 134-153.

McKinney, M.L. and Lockwood, J.L. 1999. Biotic homogenization: a few winners replacing many losers in the next mass extinction. *Trends in Ecology and Evolution* **14**: 450-453.

Oertli, B. 2008. The use of dragonflies in the assessment and monitoring of aquatic habitats. In: A. Córdoba-Aguilar (ed.), *Dragonflies and Damselflies: Model organisms for Ecological and Evolutionary Research*, pp. 79-95. Oxford University Press, Oxford.

Olden, J.D. 2006. Biotic homogenization: a new research agenda for conservation biogeography. *Journal of Biogeography* **33**: 2027-2039.

Olden, J.D., LeRoy Poff, N., Douglas, M.R., Douglas, M.E. and Fausch, K.D. 2004. Ecological and evolutionary consequences of biotic homogenization. *Trends in Ecology and Evolution* **19**: 18-24.

Olson, D.M. and Dinerstein, E. 1998. The Global 200: A representation approach to conserving the earth's most biologically valuable ecoregions. *Conservation Biology* **12**: 502-515.

Olson, D.M. and Dinerstein, E. 2002. The Global 200: Priority ecoregions for global conservation. *Annals of the Missouri Botanical Garden* **89**: 199-224.

Olson, D.M., Dinerstein, E., Wikramanayake, E.D., Burgess, N.D., Powell, G.V.N., Underwood, E.C., D'Amico, J.A., Itoua, I., Strand, H. E., Morrison, J.C., Loucks, C.J., Allnutt, T.F., Ricketts, T.H., Kura, Y., Lamoreux, J.F., Wettengel, W.W., Hedao, P. and Kassem, K.R. 2001. Terrestrial ecoregions of the world: A new map of life on earth. *BioScience* **51**: 933-938.

Panzer, R. and Schwartz, M.W. 1998. Effectiveness of a vegetation-based approach to insect conservation. *Conservation Biology* **12**: 693-702.

Parmesan, C. 2006. Ecological and evolutionary responses to recent climate change. *Annual Review of Ecology, Evolution, and Systematics* **37**: 637-669.

Pereira, H.M., Leadley, P.W., Proença, V., Alkemade, R., Scharlemann, J.P.W., Fernandez-Manjarrés, J.F., Araújo, M.B., Balvanera, P., Biggs, R., Cheung, W.W.L., Chini, L., Cooper, H.D., Gilman, E.L., Guénette, S., Hurtt, G.C., Huntington, H.P., Mace, G.M., Oberdorff, T., Revenga, C., Rodrigues, P., Scholes, R.J., Sumaila, U.R. and Walpole, M. 2010. Scenarios for Global Biodiversity in the 21st Century. *Science* **330**: 1496-1501.

Rosset, V., Simaika, J.P., Arthaud, F., Bornette, G., Vallod, D., Samways, M.J. and Oertli, B. 2013. Comparative assessment of scoring methods to evaluate the conservation value of pond and small lake biodiversity. *Aquatic Conservation: Marine and Freshwater Ecosystems* **23**: 23-36.

Samways, M.J. 2006. National Red List of South African Odonata. *Odonatologica* **35**: 341-368.

Samways, M.J. 2010. *Syncordulia gracilis. The IUCN Red List of Threatened Species 2010*: e.T63202A12628404. http://dx.doi.org/10.2305/IUCN.UK.2010-3.RLTS.T63202A12628404.en.

Samways, M.J. and Simaika, J.P. 2016. *Manual of Freshwater Assessment for South Africa: Dragonfly Biotic Index*. *Suricata* 2. South African National Biodiversity Institute, Pretoria, South Africa.

Samways, M.J. and Taylor, S. 2004. Impacts of invasive alien plants on Red-listed South African dragonflies (Odonata). *South African Journal of Science* **100**: 78-80.

Shumway, C.A. 1999. *Forgotten waters: Freshwater and marine ecosystems in Africa*. Strategies for biodiversity conservation and sustainable development. Boston University, Boston, USA.

Silva, D. de paiva, De Marco, P. and Resende, D.C. 2010. Adult odonate abundance and community assemblage measures as indicators of stream ecological integrity: A case study. *Ecological Indicators* **10**: 744-752.

Simaika, J.P. and Samways, M. J. 2009. An easy-to-use index of ecological integrity for prioritizing freshwater sites and for assessing habitat quality. *Biodiversity and Conservation* **18**: 1171-1185.

Simaika, J.P. and Samways, M.J. 2010. Large-scale estimators of threatened freshwater catchment species relative to practical conservation management. *Biological Conservation* **143**: 311-320.

Simaika, J.P. and Samways, M.J. 2011. Comparative assessment of indices of freshwater habitat conditions using different invertebrate taxon sets. *Ecological Indicators* **11**: 370-378.

Simaika, J.P. and Samways, M.J. 2012. Using dragonflies to monitor and prioritize lotic systems: a South African perspective. *Organisms, Diversity and Evolution* **12**: 251-259.

Simaika, J.P., Samways, M.J., Kipping, J., Suhling, F., Dijkstra, K.-D.B., Clausnitzer, V., Boudot, J.-P. and Domisch, S. 2013. Continental-scale conservation prioritization of African dragonflies. *Biological Conservation* **157**: 245-254.

Smith, J., Samways, M.J. and Taylor, S. 2007. Assessing riparian quality using two complementary sets of bioindicators. *Biodiversity and Conservation* **16**: 2695-2713.

Suhling, F., Samways, M.J., Simaika, J.P. and Kipping, J. 2009. The status and distribution of dragonflies (Odonata). In: W.R.T. Darwall, K.G. Smith, D. Tweddle and P. Skelton (eds.), *The Status and Distribution of Freshwater Biodiversity of Southern Africa*, pp. 48-65. IUCN, Gland, Switzerland and SAIAB, Grahamstown, South Africa.

The Nature Conservancy. 2013. *TNC Maps: Terrestrial Ecoregions*. http://maps.tnc.org/gis_data.html.

UNEP (United Nations Environment Programme) and AMCEN Secretariat. 2002. *Africa environment outlook: past, present, and future perspectives*. Earthprint for and on behalf of the United Nations Environment Programme, Stevenage, Hertfordshire.

Valente-Neto, F., Roque, F. de Oliveira, Rodrigues, M.E., Juen, L. and Swan, C.M. 2016. Toward a practical use of Neotropical odonates as bioindicators: Testing congruence across taxonomic resolution and life stages. *Ecological Indicators* **61**: 952-959.

Vörösmarty, C.J., McIntyre, P.B., Gessner, M.O., Dudgeon, D., Prusevich, A., Green, P., Glidden, S., Bunn, S.E., Sullivan, C.A., Reidy Liermann, C. and Davies, P.M. 2010. Global threats to human water security and river biodiversity. *Nature* **467**: 555-561.

APPENDIX A1: Description of the South African Dragonfly Biotic Index (DBI) sub-indices.

Sub-indices of the South African Dragonfly Biotic Index (DBI), i.e. the species' geographical distribution, level of threat and sensitivity to anthropogenic disturbances to their habitat (Samways & Simaika 2016). The scores of each sub-index range from 0 to 3 with the total DBI score per species being the sum of the scores of the three sub-indices, which ranges from 0 to 9. Abbreviations of the IUCN species threat status (2016): LC – Least Concern, NT – Near Threatened, VU – Vulnerable, EN – Endangered and CR – Critically Endangered. Other abbreviations: GS – Global Status and NS – National Status.

Score	Distribution	Threat*	Sensitivity
0	Very common throughout South Africa and in southern Africa.	LC (GS *and* NS)	Not sensitive; almost impervious to habitat disturbance and may even benefit from habitat change due to alien plants; may thrive in artificial waterbodies.
1	Localised across a wide area in South Africa, and localised or common in southern Africa; or very common in 1-3 South African provinces, and localised or common in southern Africa.	NT (GS and/or NS) *or* VU (NS)	Low sensitivity to habitat change from alien plants; may occur commonly in artificial waterbodies.
2	National endemic confined to three or more South African provinces; or widespread in southern Africa, but marginal and very rare in South Africa.	VU (GS), *or* EN or CR (NS)	Medium sensitivity to habitat disturbance (e.g. alien plants and bank disturbance); may have been recorded from artificial waterbodies.
3	Endemic or near-endemic and confined to only one or two South African provinces.	EN or CR (GS) (= EN or CR (NS))	Extremely sensitive to habitat change from alien plants; only occurs in undisturbed natural habitat.

*Always use the highest threat status.

APPENDIX A2: Description of the African Dragonfly Habitat Matrix (ADHM).

Description of the 27 habitat attributes used in the African Dragonfly Habitat Matrix (ADHM). Included, are the weights used to determine the severity of the possible anthropogenic impacts on the dragonfly species' habitats.

Habitat Categories	Attributes (codes)	Weights	Description of attributes
Landscape (canopy cover)	Fs	4	Shaded habitat in a forested landscape, i.e. more than half of the banks is shaded by forest that extends over 100 meters from them.
	Fx	1	Exposed habitat in a forested landscape, i.e. more than half of the banks in full sun (e.g. in larger clearings or farm bush).
	Os	2	Shaded habitat in an open landscape, i.e. more than half of the banks is shaded in otherwise open context (e.g. forest galleries).
	Ox	3	Exposed habitat in an open landscape, i.e. no cover anywhere (e.g. grasslands and fynbos).
Water body type	Ac	1	Acidic and/or oligotrophic conditions, as evidenced by visual clues like blackwater streams on leached soils; or plants such as peat moss, bladderworts and sundews.
	Sp	4	Seeps, springs, rock trickles, damp ground and waterfall spray zones (species preferring latter should all have been removed from 'fast flow', as larval habitat is a by-product of a strong current).
	Hd	3	Headwater, i.e. smallest flowing waters, just below the source.
	St	3	Stream, i.e. flowing water of intermediate or average size. The water body's size can only be expressed relatively, being gradual from source to mouth. Thus, 'stream' is by default lotic habitat (i.e. unspecified or unknown), and the scale is specified only where possible and appropriate.
	Sc	4	Channels, i.e. narrow and often relatively rapid sections in large marshes or open river systems (e.g. Okavango and Bangweulu).
	Rv	2	River, i.e. large flowing water.

APPENDIX A2: (*continued*)

Habitat Categories	Attributes (codes)	Weights	Description of attributes
Water body type (*cont.*)	Ps	4	Sections of reduced water movement particularly pools in stream beds, i.e. permanent calm sections with through-flow (if combined with lotic habitat attribute) or pools filled by stream flooding (combined with stagnant and often temporary water).
	Fa	4	Sections of rapid water movement (e.g. rapids, white water, waterfalls and splash zones of lakes, but excludes spray zones, as larval habitat is a by-product of a strong current).
	Lk	1	Lake, i.e. open shores of very large standing bodies with enough wave motion to create lotic circumstances (e.g. 'freshwater seas' like Lakes Victoria and Volta).
	Sg	2	Stagnant, i.e. any standing water without frequent wave motion or that is being held by plants, such as pools and ponds.
	Ph	4	Phytotelms, i.e. tree holes and other pockets of water held by plants.
	Tp	3	Ephemeral or temporary waters, i.e. water appear or expand with seasonal flooding, rather than with stable level.
Microhabitat (substrate and vegetation)	Ro	1	Large rocks, boulders or bedrock.
	Gr	1	Gravel and small stones.
	Sa	1	Sandy substrates.
	So	2	Any soft substrate (e.g. mud, silt and/or fine detritus).
	Wd	3	Large woody debris (e.g. dead tree trunks in water).
	Dt	3	Deposits of (coarse) detritus, like leaf litter, in stream pools or on seeps.
	Rt	3	Submerged roots and twigs of trees and bushes standing on the banks.
	Ob	3	Overhanging twigs and branches, used mostly for oviposition (e.g. *Chalcolestes viridis*, *Malgassophlebia* spp. and *Tetrathemis* spp.).
	Aq	2	Aquatic plants, i.e. floating and submerged.

APPENDIX A2: (*continued*)

Habitat Categories	Attributes (codes)	Weights	Description of attributes
Microhabitat (substrate and vegetation) (*cont.*)	Em	2	Emergent plants like grasses and reeds of open marsh and riparian vegetation; or arrowroots (*Marantaceae*) and ferns in the shade (excludes treed banks).
	Ba	2	Patches of bare soil, i.e. without aquatic, emergent or riparian vegetation.

APPENDIX A3: The African Dragonfly Biotic Index (ADBI) scores of the 604 African dragonfly species.

A list of 604 African dragonfly species (Anisoptera and Zygoptera) with their three sub-index scores (i.e. geographical distribution (GD), threat status (TS) and species vulnerability (SV)) as well as their African Dragonfly Biotic Index (ADBI) scores. Also included, are their vernacular names, global Red List (RL) categories and global RL criteria. IUCN threat status abbreviations used (IUCN 2016): LC – Least Concern, NT – Near Threatened, DD – Data Deficient, VU – Vulnerable, EN – Endangered and CR – Critically Endangered.

ANISOPTERA	DRAGONFLIES	Global RL category	Global RL criteria	Sub-indices			Species
				GD	TS	SV	ADBI
AESHNIDAE	**HAWKERS**						
• *Aeshna affinis* Vander Linden, 1820	Blue-eyed Hawker	LC		2	0	2	4
• *A. cyanea* (Müller, 1764)	Blue Hawker	LC		2	0	1	3
• *A. isoceles* (Müller, 1767)	Green-eyed Hawker	LC		2	0	2	4
• *A. mixta* Latreille, 1805	Migrant Hawker	LC		1	0	1	2
• *Afroaeschna scotias* (Pinhey, 1952)	Shadow Hawker	LC		2	0	3	5
• *Anaciaeschna triangulifera* McLachlan, 1896	Evening Hawker	LC		1	0	0	1
• *Anax bangweuluensis* Kimmins, 1955	Swamp Emperor	NT		2	1	2	5
• *A. chloromelas* Ris, 1911	Black-and-blue Emperor	LC		1	0	1	2
• *A. congoliath* Fraser, 1953	Dark Emperor	LC		2	0	1	3
• *A. ephippiger* (Burmeister, 1839)	Vagrant Emperor	LC		0	0	1	1
• *A. imperator* Leach, 1815	Blue Emperor	LC		0	0	1	1
• *A. parthenope* Sélys, 1839	Lesser Emperor	LC		0	0	1	1
• *A. rutherfordi* McLachlan, 1883	Western Orange Emperor	LC		2	0	2	4
• *A. speratus* Hagen, 1867	(Eastern) Orange Emperor	LC		1	0	1	2
• *A. tristis* Hagen, 1867	Black Emperor	LC		0	0	1	1
• *Boyeria irene* (Fonscolombe, 1838)	Western Spectre	LC		2	0	1	3
• *Gynacantha africana* (Palisot de Beauvois, 1807)	Giant Duskhawker	LC		1	0	2	3
• *G. bullata* Karsch, 1891	Black-kneed Duskhawker	LC		1	0	2	3
• *G. cylindrata* Karsch, 1891	Greater Girdled Duskhawker	LC		1	0	2	3

APPENDIX A3: (*continued*)

ANISOPTERA	DRAGONFLIES	Global RL category	Global RL criteria	Sub-indices			Species
				GD	TS	SV	ADBI
AESHNIDAE (*cont.*)	**HAWKERS**						
• *Gynacantha immaculifrons* Fraser, 1956	Plain Duskhawker	LC		2	0	2	4
• *G. manderica* Grünberg, 1902	Little Duskhawker	LC		0	0	1	1
• *G. nigeriensis* (Gambles, 1956)	Yellow-legged Duskhawker	LC		1	0	2	3
• *G. sextans* McLachlan, 1896	Dark-rayed Duskhawker	LC		1	0	2	3
• *G. usambarica* Sjöstedt, 1909	Eastern Duskhawker (Usambara Duskhawker)	LC		1	0	2	3
• *G. vesiculata* Karsch, 1891	Lesser Girdled Duskhawker	LC		1	0	2	3
• *G. victoriae* (Pinhey, 1961)	Victoria's Duskhawker	LC		1	0	2	3
• *G. villosa* Grünberg, 1902	Brown Duskhawker	LC		1	0	2	3
• *Heliaeschna cynthiae* Fraser, 1939	Blade-tipped Duskhawker	LC		2	0	2	4
• *H. fuliginosa* Sélys, 1883	Black-banded Duskhawker	LC		1	0	2	3
• *H. sembe* Pinhey, 1962	Hybrid Duskhawker	LC		1	0	2	3
• *H. ugandica* McLachlan, 1896	Uganda Duskhawker	LC		2	0	2	4
• *Pinheyschna meruensis* (Sjöstedt, 1909)	Meru Hawker	LC		2	0	2	4
• *P. rileyi* (Calvert, 1892)	Bullseye Hawker	LC		2	0	1	3
• *P. subpupillata* (McLachlan, 1896)	Stream Hawker	LC		2	0	2	4
• *P. waterstoni* Peters & Theischinger, 2011	Ethiopian Hawker	NT		2	1	1	4
• *Zosteraeschna ellioti* (Kirby, 1896)	Northern Highland Hawker	LC		2	0	1	3
• *Z. minuscula* (McLachlan, 1895)	Friendly Hawker	LC		2	0	2	4
• *Z. usambarica* (Förster, 1906)	Southern Highland Hawker	LC		2	0	2	4
CORDULEGASTRIDAE							
• *Cordulegaster boltonii* (Donovan, 1807)	Common Goldenring	LC		2	0	2	4
• *C. princeps* Morton, 1916	Atlas Goldenring	LC		3	0	2	5
CORDULIIDAE	**EMERALDS**						
• *Hemicordulia africana* Dijkstra, 2007	African Emerald	LC		1	0	2	3

APPENDIX A3: (*continued*)

ANISOPTERA	DRAGONFLIES	Global RL category	Global RL criteria	Sub-indices			Species
				GD	TS	SV	ADBI
GOMPHIDAE	**CLUBTAILS**						
• *Ceratogomphus pictus* Hagen in Sélys, 1854	Common Thorntail	LC		2	0	1	3
• *C. triceraticus* Balinsky, 1963	Cape Thorntail	NT		2	1	1	4
• *Cornigomphus guineensis* Martin, 1907		LC		3	0	2	5
• *C. mariannae* (Legrand, 1992)		LC		3	0	2	5
• *Crenigomphus cornutus* Pinhey, 1956	Horned Talontail	LC		2	0	1	3
• *C. hartmanni* (Förster, 1898)	Clubbed Talontail	LC		1	0	1	2
• *C. kavangoensis* Suhling & Marais, 2006	Kavango Talontail	LC		2	0	1	3
• *C. renei* Fraser, 1936	Western Talontail	LC		0	0	0	0
• *Diastatomma bicolor* Sélys, 1869	Dark Hoetail	LC		2	0	2	4
• *D. gamblesi* Legrand, 1992	Western Hoetail	LC		2	0	2	4
• *D. multilineatum* Fraser, 1949	Blackwater Hoetail	LC		2	0	2	4
• *D. selysi* Schouteden, 1934	Common Hoetail	LC		2	0	2	4
• *D. soror* Schouteden, 1934	Painted Hoetail	LC		2	0	1	3
• *D. tricolor* (Palisot de Beauvois, 1807)	Great Hoetail	LC		2	0	2	4
• *Gomphidia bredoi* (Schouteden, 1934)	River Fingertail	LC		1	0	1	2
• *G. gamblesi* Gauthier, 1987	Forest Fingertail	LC		2	0	1	3
• *G. quarrei* (Schouteden, 1934)	Stream Fingertail (Quarre's Fingertail)	LC		1	0	1	2
• *Gomphus lucasii* Sélys, 1849	Algerian Clubtail	VU	A3c; C1	2	2	2	6
• *Ictinogomphus dundoensis* Pinhey, 1961	Swamp Tigertail	LC		2	0	1	3
• *I. ferox* (Rambur, 1842)	Common Tigertail	LC		0	0	1	1
• *I. fraseri* Kimmins, 1958	Western Tigertail	LC		1	0	1	2
• *I. regisalberti* (Schouteden, 1934)	Congo Tigertail	LC		2	0	0	2
• *Lestinogomphus angustus* Martin, 1912	Large-spined Fairytail	LC		1	0	1	2

APPENDIX A3: (*continued*)

ANISOPTERA	DRAGONFLIES	Global RL category	Global RL criteria	Sub-indices			Species
				GD	TS	SV	ADBI
GOMPHIDAE (*cont.*)	**CLUBTAILS**						
• *Lestinogomphus congoensis* Cammaerts, 1969	Congo Fairytail	LC		2	0	1	3
• *L. matilei* Legrand & Lachaise, 2001	Western Fairytail	LC		2	0	3	5
• *L. silkeae* Kipping, 2006	Small-spined Fairytail	DD		2	1	1	4
• *Libyogomphus christinae* (Legrand, 1992)	Western Horntail	LC		3	0	2	5
• *L. emiliae* (Legrand, 1992)	Gabon Horntail	LC		3	0	2	5
• *L. mamfei* (Pinhey, 1961)	Cameroon Horntail	DD		3	1	2	6
• *L. tenaculatus* Fraser, 1926	Large Horntail	LC		2	0	2	4
• *Lindenia tetraphylla* (Vander Linden, 1825)	Bladetail	LC		3	0	2	5
• *Microgomphus nyassicus* (Grünberg, 1902)	Eastern Scissortail	LC		2	0	3	5
• *Nepogomphoides stuhlmanni* (Karsch, 1899)	Eastern Horntail	VU	B1ab(ii) + 2ab(ii)	2	2	2	6
• *Neurogomphus alius* Cammaerts, 2004	Large Siphontail	LC		2	0	1	3
• *N. cocytius* Cammaerts, 2004	Kokytos Siphontail	LC		2	0	1	3
• *N. featheri* Pinhey, 1967	Striped Siphontail	LC		1	0	2	3
• *N. fuscifrons* Karsch, 1890	Dusky Siphontail	LC		2	0	1	3
• *N. martininus* (Lacroix, 1921)	Black Siphontail	LC		2	0	1	3
• *N. uelensis* Schouteden, 1934	Congo Siphontail	LC		2	0	1	3
• *N. zambeziensis* Cammaerts, 2004	Zambezi Siphontail	LC		2	0	1	3
• *Notogomphus cottarellii* Consiglio, 1978	Cottarelli's Longleg	EN	B1ab(iii) + 2ab(iii)	3	3	2	8
• *N. dendrohyrax* (Förster, 1906)	Dark Longleg	LC		2	0	1	3
• *N. dorsalis* (Sélys, 1858)	Little Longleg	LC		2	0	0	2
• *N. kilimandjaricus* (Sjöstedt, 1909)	Rusty-tipped Longleg	LC		3	0	1	4
• *N. lecythus* Campion, 1923	Northern Longleg	LC		2	0	0	2
• *N. leroyi* (Schouteden, 1934)	Clubbed Longleg	LC		2	0	2	4
• *N. lujai* (Schouteden, 1934)	Albertine Longleg	LC		2	0	2	4

APPENDIX A3: (*continued*)

ANISOPTERA	DRAGONFLIES	Global RL category	Global RL criteria	Sub-indices			Species
				GD	TS	SV	ADBI
GOMPHIDAE (*cont.*)	**CLUBTAILS**						
• *Notogomphus maathaiae* Clausnitzer & Dijkstra, 2005	Maathai's Longleg	EN	B2ab(iii)	3	3	3	9
• *N. maryae* Vick, 2003	Mary's Longleg	DD		3	1	2	6
• *N. moorei* Vick, 2003	Large Longleg	LC		2	0	1	3
• *N. praetorius* (Sélys, 1878)	Yellowjack Longleg	LC		1	0	1	2
• *N. ruppeli* (Sélys, 1858)	Rüppell's Longleg	EN	B2ab(iii)	3	3	3	9
• *N. spinosus* (Karsch, 1890)	Jungle Longleg	LC		2	0	3	5
• *N. zernyi* (St. Quentin, 1942)	Striped Longleg	LC		2	0	1	3
• *Onychogomphus costae* (Sélys, 1885)	Faded Pincertail	NT		2	1	1	4
• *O. forcipatus* (Linnaeus, 1758)	Small Pincertail	LC		2	0	1	3
• *O. kitchingmani* Pinhey, 1961	Pale Claspertail	DD		3	1	1	5
• *O. seydeli* (Schouteden, 1934)	Southern Dark Claspertail	LC		2	0	1	3
• *O. styx* Pinhey, 1961	Northern Dark Claspertail	LC		2	0	0	2
• *O. supinus* Hagen in Sélys, 1854	Gorge Claspertail	LC		2	0	1	3
• *O. uncatus* (Charpentier, 1840)	Large Pincertail	LC		2	0	1	3
• *Paragomphus abnormis* (Karsch, 1890)		LC		2	0	0	2
• *P. acuminatus* Fraser, 1949	Congo Hooktail	LC		2	0	0	2
• *P. alluaudi* (Martin, 1915)	Highland Hooktail	LC		2	0	1	3
• *P. cataractae* Pinhey, 1963	Cataract Hooktail	NT		2	1	2	5
• *P. cognatus* (Rambur, 1842)	Rock Hooktail (Boulder Hooktail)	LC		1	0	1	2
• *P. crenigomphoides* Clausnitzer & Dijkstra, 2005	Ethiopian Hooktail	NT		2	1	2	5
• *P. elpidius* (Ris, 1921)	Corkscrew Hooktail	LC		1	0	1	2
• *P. genei* (Sélys, 1841)	Common Hooktail (Green Hooktail)	LC		0	0	1	1
• *P. kiautai* Legrand, 1992	Kiauta's Hooktail	LC		3	0	0	3

APPENDIX A3: (*continued*)

ANISOPTERA	DRAGONFLIES	Global RL category	Global RL criteria	Sub-indices			Species
				GD	TS	SV	ADBI
GOMPHIDAE (*cont.*)	**CLUBTAILS**						
• *Paragomphus machadoi* Pinhey, 1961	Forest Hooktail	LC		2	0	1	3
• *P. magnus* Fraser, 1952	Great Hooktail	LC		2	0	1	3
• *P. nigroviridis* Cammaerts, 1969	Black-and-green Hooktail	LC		1	0	2	3
• *P. nyasicus* Kimmins, 1955	Malawi Hooktail	NT		3	1	0	4
• *P. pumilio* (Rambur, 1842)	Dwarf Hooktail	LC		1	0	1	2
• *P. sabicus* Pinhey, 1950	Clubbed Hooktail (Sabi Hooktail)	LC		1	0	1	2
• *P. serrulatus* (Baumann, 1898)	Tiger Hooktail	LC		1	0	1	2
• *P. sinaiticus* (Morton, 1929)	Desert Hooktail	NT		1	1	2	4
• *P. tournieri* Legrand, 1992	Tournier's Hooktail	LC		3	0	2	5
• *P. viridior* Pinhey, 1961	Green-fronted Hooktail	LC		2	0	1	3
• *P. zambeziensis* Pinhey, 1961	Zambezi Hooktail	DD		2	1	1	4
• *Phyllogomphus aethiops* Sélys, 1854		LC		2	0	0	2
• *P. annulus* Klots, 1944	Crested Leaftail	LC		2	0	1	3
• *P. coloratus* Kimmins, 1931	Helmeted Leaftail	LC		2	0	1	3
• *P. moundi* Fraser, 1960		LC		2	0	0	2
• *P. selysi* Schouteden, 1933	Bold Leaftail	LC		1	0	1	2
• *Tragogomphus ellioti* Legrand, 2002	Pinhey's Horntail	NT		3	1	2	6
LIBELLULIDAE	**SKIMMERS**						
• *Acisoma inflatum* Sélys, 1882	Stout Pintail	LC		0	0	0	0
• *A. trifidum* Kirby, 1898	Pied Pintail	LC		0	0	0	0
• *A. variegatum* Kirby, 1889	Slender Pintail	LC		1	0	2	3
• *Aethiothemis basilewskyi* Fraser, 1954	Black Flasher	LC		2	0	2	4
• *A. bella* (Fisher, 1939)	Striped Flasher	LC		1	0	1	2
• *A. bequaerti* Ris, 1919	Skimmer-like Flasher	LC		1	0	2	3

APPENDIX A3: (*continued*)

ANISOPTERA	DRAGONFLIES	Global RL category	Global RL criteria	Sub-indices			Species
				GD	TS	SV	ADBI
LIBELLULIDAE (*cont.*)	**SKIMMERS**						
• *Aethiothemis ellioti* (Lieftinck, 1969)	Plump Flasher	LC		2	0	1	3
• *A. erythromelas* (Ris, 1910)	Pin-tailed Flasher	LC		2	0	2	4
• *A. incongruens* (Karsch, 1893)	Slender Flasher	LC		2	0	3	5
• *A. mediofasciata* Ris, 1931	Orange Flasher	LC		1	0	1	2
• *A. solitaria* Ris in Martin, 1908	Pearly Flasher	LC		0	0	1	1
• *Aethriamanta rezia* Kirby, 1889	Pygmy Basker	LC		0	0	1	1
• *Atoconeura aethiopica* Kimmins, 1958	Ethiopian Highlander	VU	A2c; B1ab(iii)	3	2	1	6
• *A. biordinata* Karsch, 1899	Common Highlander	LC		2	0	1	3
• *A. eudoxia* (Kirby, 1909)	Fishtail Highlander	LC		2	0	2	4
• *A. kenya* Longfield, 1953	Kenyan Highlander	LC		2	0	1	3
• *A. luxata* Dijkstra, 2006	Western Highlander	LC		1	0	2	3
• *A. pseudeudoxia* Longfield, 1953	Hairy-legged Highlander	LC		2	0	2	4
• *Brachythemis impartita* (Karsch, 1890)	Northern Banded Groundling	LC		0	0	0	0
• *B. lacustris* (Kirby, 1889)	Red Groundling	LC		0	0	1	1
• *B. leucosticta* (Burmeister, 1839)	Southern Banded Groundling	LC		0	0	1	1
• *B. wilsoni* Pinhey, 1952	Swamp Groundling	LC		1	0	1	2
• *Bradinopyga cornuta* Ris, 1911	Horned Rockdweller	LC		1	0	1	2
• *B. strachani* (Kirby, 1900)	Red Rockdweller	LC		0	0	0	0
• *Chalcostephia flavifrons* Kirby, 1889	Inspector	LC		0	0	1	1
• *Crocothemis brevistigma* Pinhey, 1961	Spotted Scarlet	LC		2	0	2	4
• *C. divisa* Baumann, 1898	Rock Scarlet (Divisa Scarlet)	LC		0	0	1	1
• *C. erythraea* (Brullé, 1832)	Broad Scarlet	LC		0	0	1	1
• *C. sanguinolenta* (Burmeister, 1839)	Little Scarlet	LC		0	0	1	1

APPENDIX A3: (*continued*)

ANISOPTERA	DRAGONFLIES	Global RL category	Global RL criteria	Sub-indices			Species
				GD	TS	SV	ADBI
LIBELLULIDAE (*cont.*)	**SKIMMERS**						
• *Crocothemis saxicolor* Ris, 1919	Granite Scarlet	LC		2	0	1	3
• *Cyanothemis simpsoni* Ris, 1915	Bluebolt	LC		1	0	1	2
• *Diplacodes deminuta* Lieftinck, 1969	Little Percher	LC		1	0	2	3
• *D. lefebvrii* (Rambur, 1842)	Black Percher	LC		0	0	1	1
• *D. luminans* (Karsch, 1893)	Barbet Percher	LC		0	0	0	0
• *D. pumila* Dijkstra, 2006	Dwarf Percher	LC		2	0	1	3
• *Eleuthemis buettikoferi* Ris, 1910	Sunlight Firebelly	LC		1	0	1	2
• *E. quadrigutta* Pinhey, 1974		LC		2	0	2	4
• *Hadrothemis camarensis* (Kirby, 1889)	Saddled Jungleskimmer	LC		1	0	3	4
• *H. coacta* (Karsch, 1891)	Robust Jungleskimmer	LC		1	0	1	2
• *H. defecta* (Karsch, 1891)	Scarlet Jungleskimmer	LC		0	0	1	1
• *H. infesta* (Karsch, 1891)	Slender Jungleskimmer	LC		1	0	1	2
• *H. scabrifrons* Ris, 1910	Ruddy Jungleskimmer	LC		2	0	2	4
• *H. versuta* (Karsch, 1891)	Variable Jungleskimmer	LC		1	0	2	3
• *H. vrijdaghi* Schouteden, 1934	Golden-winged Jungleskimmer	LC		2	0	3	5
• *Hemistigma albipunctum* (Rambur, 1842)	Common Piedspot	LC		0	0	0	0
• *Libellula quadrimaculata* Linnaeus, 1758	Four-spotted Chaser	LC		3	0	2	5
• *Macrodiplax cora* (Kaup in Brauer, 1867)	Coastal Pennant (Cora's Pennant)	LC		1	0	2	3
• *Malgassophlebia bispina* Fraser, 1958	Ringed Leaftipper	LC		1	0	2	3
• *M. westfalli* Legrand, 1986	Dark Leaftipper	LC		3	0	3	6
• *Micromacromia camerunica* Karsch, 1890	Stream Micmac	LC		1	0	1	2
• *M. zygoptera* (Ris, 1909)	Spring Micmac	LC		1	0	3	4
• *Neodythemis afra* (Ris, 1909)	Seepage Junglewatcher	LC		2	0	3	5
• *N. campioni* Ris, 1915	River Junglewatcher	LC		3	0	1	4

APPENDIX A3: (*continued*)

ANISOPTERA	DRAGONFLIES	Global RL category	Global RL criteria	Sub-indices			Species
				GD	TS	SV	ADBI
LIBELLULIDAE (*cont.*)	**SKIMMERS**						
• *Neodythemis fitzgeraldi* Pinhey, 1961	Powdered Junglewatcher	LC		2	0	1	3
• *N. klingi* (Karsch, 1890)	Stream Junglewatcher	LC		1	0	1	2
• *N. munyaga* Dijkstra & Vick, 2006	Bwindi Junglewatcher	CR	B1ab(i) + B2ab(i, iii)	3	3	2	8
• *N. preussi* (Karsch, 1891)	Swamp Junglewatcher	LC		2	0	1	3
• *N. takamandensis* (Vick, 2000)	Bizarre Junglewatcher	LC		2	0	2	4
• *Nesciothemis farinosa* (Förster, 1898)	Eastern Blacktail (Black-tailed Skimmer)	LC		0	0	1	1
• *N. fitzgeraldi* Longfield, 1955	Lesser Peppertail	LC		2	0	1	3
• *N. minor* Gambles, 1966	Small Blacktail	LC		1	0	1	2
• *N. nigeriensis* Gambles, 1966	Greater Peppertail	LC		1	0	1	2
• *N. pujoli* Pinhey, 1971	Western Blacktail	LC		1	0	2	3
• *Notiothemis jonesi* Ris, 1919	Eastern Forestwatcher (Jone's Forestwatcher)	LC		1	0	2	3
• *N. robertsi* Fraser, 1944	Western Forestwatcher	LC		1	0	2	3
• *Olpogastra lugubris* Karsch, 1895	Bottletail (Slender Bottletail)	LC		0	0	1	1
• *Orthetrum abbotti* Calvert, 1892	Little Skimmer	LC		0	0	1	1
• *O. africanum* (Sélys, 1887)	Elongate Skimmer	LC		1	0	1	2
• *O. angustiventre* (Rambur, 1842)	Many-celled Skimmer	LC		1	0	1	2
• *O. austeni* (Kirby, 1900)	Giant Skimmer	LC		1	0	1	2
• *O. brachiale* (Palisot de Beauvois, 1817)	Strong Skimmer	LC		0	0	0	0
• *O. brunneum* (Fonscolombe, 1837)	Southern Skimmer	LC		2	0	2	4
• *O. caffrum* (Burmeister, 1839)	Two-striped Skimmer	LC		1	0	2	3
• *O. camerunense* Gambles, 1959	One-striped Skimmer	LC		1	0	2	3
• *O. cancellatum* (Linnaeus, 1758)	Black-tailed Skimmer	LC		2	0	2	4
• *O. chrysostigma* (Burmeister, 1839)	Epaulet Skimmer	LC		0	0	1	1
• *O. coerulescens* (Fabricius, 1798)	Keeled Skimmer	LC		1	0	2	3

APPENDIX A3: (*continued*)

ANISOPTERA	DRAGONFLIES	Global RL category	Global RL criteria	Sub-indices			Species
				GD	TS	SV	ADBI
LIBELLULIDAE (*cont.*)	**SKIMMERS**						
• *Orthetrum guineense* Ris, 1910	Guinea Skimmer	LC		0	0	1	1
• *O. hintzi* Schmidt, 1951	Dark-shouldered Skimmer (Hintz's Skimmer)	LC		0	0	1	1
• *O. icteromelas* Ris, 1910	Spectacled Skimmer	LC		0	0	1	1
• *O. julia* Kirby, 1900	Julia Skimmer	LC		0	0	1	1
• *O. kristenseni* Ris, 1911	Ethiopian Skimmer	LC		2	0	2	4
• *O. latihami* Pinhey, 1966	Dambo Skimmer	LC		1	0	1	2
• *O. machadoi* Longfield, 1955	Highland Skimmer (Machado's Skimmer)	LC		0	0	1	1
• *O. macrostigma* Longfield, 1947	Sharkfin Skimmer	LC		2	0	2	4
• *O. microstigma* Ris, 1911	Farmbush Skimmer	LC		0	0	0	0
• *O. monardi* Schmidt, 1951	Woodland Skimmer	LC		0	0	1	1
• *O. nitidinerve* (Sélys, 1841)	Yellow-veined Skimmer	LC		2	0	2	4
• *O. ransonnetii* (Brauer, 1865)	Desert Skimmer	LC		0	0	1	1
• *O. robustum* Balinsky, 1965	Robust Skimmer	LC		2	0	1	3
• *O. rubens* Barnard, 1937	Elusive Skimmer	CR	D	3	3	2	8
• *O. sabina* (Drury, 1770)	Slender Skimmer	LC		0	0	1	1
• *O. saegeri* Pinhey, 1966	Mushroom Skimmer	LC		1	0	1	2
• *O. stemmale* (Burmeister, 1839)	Tough Skimmer	LC		0	0	1	1
• *O. trinacria* (Sélys, 1841)	Long Skimmer	LC		0	0	1	1
• *Oxythemis phoenicosceles* Ris, 1910	Pepperpants	LC		1	0	1	2
• *Palpopleura albifrons* Legrand, 1979	Pale-faced Widow	LC		2	0	1	3
• *P. deceptor* (Calvert, 1899)	Deceptive Widow	LC		0	0	0	0
• *P. jucunda* Rambur, 1842	Yellow-veined Widow	LC		0	0	0	0
• *P. lucia* (Drury, 1773)	Black-winged Widow	LC		0	0	0	0
• *P. portia* (Drury, 1773)	Silver-winged Widow	LC		0	0	0	0

APPENDIX A3: (*continued*)

ANISOPTERA	DRAGONFLIES	Global RL category	Global RL criteria	Sub-indices			Species
				GD	TS	SV	ADBI
LIBELLULIDAE (*cont.*)	**SKIMMERS**						
• *Pantala flavescens* (Fabricius, 1798)	Wandering Glider (Pantala)	LC		0	0	1	1
• *Parazyxomma flavicans* (Martin, 1908)	Banded Duskdarter	LC		0	0	1	1
• *Porpax asperipes* Karsch, 1896	Powdered Pricklyleg	LC		2	0	1	3
• *P. bipunctus* Pinhey, 1966	Seepage Pricklyleg	LC		1	0	3	4
• *P. garambensis* Pinhey, 1966	Little Pricklyleg	LC		2	0	2	4
• *P. risi* Pinhey, 1958	Highland Pricklyleg	LC		2	0	1	3
• *P. sentipes* Dijkstra, 2006	Congo Pricklyleg	LC		2	0	2	4
• *Rhyothemis fenestrina* (Rambur, 1842)	Skylight Flutterer	LC		0	0	1	1
• *R. mariposa* Ris, 1913	Butterfly Flutterer	LC		2	0	2	4
• *R. notata* (Fabricius, 1781)	Veiled Flutterer	LC		1	0	1	2
• *R. semihyalina* (Desjardins, 1832)	Phantom Flutterer	LC		0	0	1	1
• *Selysiothemis nigra* (Vander Linden, 1825)	Black Pennant	LC		1	0	1	2
• *Sympetrum fonscolombii* (Sélys, 1840)	Red-veined Darter	LC		0	0	0	0
• *S. meridionale* (Sélys, 1841)	Southern Darter	LC		2	0	2	4
• *S. sanguineum* (Müller, 1764)	Ruddy Darter	LC		2	0	1	3
• *S. sinaiticum* Dumont, 1977	Desert Darter	LC		1	0	1	2
• *S. striolatum* (Charpentier, 1840)	Common Darter	LC		2	0	1	3
• *Tetrathemis camerunensis* (Sjöstedt, 1900)	Forest Elf	LC		0	0	0	0
• *T. corduliformis* Longfield, 1936	Club-tailed Elf	LC		2	0	2	4
• *T. fraseri* Legrand, 1977	Treefall Elf	LC		2	0	2	4
• *T. godiardi* Lacroix, 1921	Western Elf	LC		2	0	2	4
• *T. longfieldae* Legrand, 1977	Yellow-winged Elf	LC		2	0	2	4
• *T. polleni* (Sélys, 1869)	Black-splashed Elf	LC		0	0	1	1

APPENDIX A3: (*continued*)

ANISOPTERA	DRAGONFLIES	Global RL category	Global RL criteria	Sub-indices			Species
				GD	TS	SV	ADBI
LIBELLULIDAE (*cont.*)	**SKIMMERS**						
• *Thermochoria equivocata* Kirby, 1889	Dash-winged Piedface	LC		1	0	3	4
• *T. jeanneli* (Martin, 1915)	Clear-winged Piedface	LC		2	0	2	4
• *Tholymis tillarga* (Fabricius, 1798)	Twister	LC		0	0	0	0
• *Tramea basilaris* (Palisot de Beauvois, 1817)	Keyhole Glider	LC		0	0	0	0
• *T. limbata* (Desjardins, 1832)	Voyaging Glider	LC		0	0	0	0
• *Trithemis aconita* Lieftinck, 1969	Halfshade Dropwing (Monkshood Dropwing)	LC		0	0	0	0
• *T. aenea* Pinhey, 1961	Bronze Dropwing	LC		1	0	0	1
• *T. aequalis* Lieftinck, 1969	Swamp Dropwing	NT		2	1	1	4
• *T. africana* (Brauer, 1867)	Western Mantled Dropwing	LC		2	0	2	4
• *T. annulata* (Palisot de Beauvois, 1807)	Violet Dropwing	LC		0	0	0	0
• *T. anomala* Pinhey, 1956	Striped Dropwing	LC		2	0	1	3
• *T. apicalis* (Fraser, 1954)	Furtive Dropwing	LC		2	0	0	2
• *T. arteriosa* (Burmeister, 1839)	Red-veined Dropwing	LC		0	0	0	0
• *T. basitincta* Ris, 1912	Jungle Dropwing	LC		1	0	2	3
• *T. bifida* Pinhey, 1970	Shadow Dropwing	LC		0	0	0	0
• *T. bredoi* Fraser, 1953	River Dropwing	LC		1	0	1	2
• *T. congolica* Pinhey, 1970	Congo Dropwing	LC		2	0	1	3
• *T. dejouxi* Pinhey, 1978	Northern Denim Dropwing	LC		1	0	2	3
• *T. dichroa* Karsch, 1893	Black Dropwing	LC		1	0	1	2
• *T. donaldsoni* (Calvert, 1899)	Southern Denim Dropwing	LC		1	0	2	3
• *T. dorsalis* (Rambur, 1842)	Highland Dropwing (Round-hook Dropwing)	LC		1	0	2	3
• *T. ellenbeckii* Förster, 1906	Ethiopian Dropwing	LC		2	0	2	4
• *T. fumosa* Pinhey, 1962	Smoky Dropwing	LC		2	0	0	2

APPENDIX A3: (*continued*)

ANISOPTERA	DRAGONFLIES	Global RL category	Global RL criteria	Sub-indices			Species
				GD	TS	SV	ADBI
LIBELLULIDAE (*cont.*)	**SKIMMERS**						
• *Trithemis furva* Karsch, 1899	Navy Dropwing	LC		1	0	1	2
• *T. grouti* Pinhey, 1961	Dark Dropwing	LC		1	0	1	2
• *T. hartwigi* Pinhey, 1970	Superb Dropwing	LC		2	0	1	3
• *T. hecate* Ris, 1912	Slender Dropwing	LC		0	0	1	1
• *T. imitata* Pinhey, 1961	Northern Fluttering Dropwing	LC		0	0	1	1
• *T. integra* Dijkstra, 2007	Albertine Dropwing	LC		2	0	3	5
• *T. kalula* Kirby, 1900	Pretty Dropwing	LC		1	0	1	2
• *T. kirbyi* Sélys, 1891	Orange-winged Dropwing (Kirby's Dropwing)	LC		0	0	0	0
• *T. leakeyi* (Pinhey, 1956)	Mealy Dropwing	LC		2	0	1	3
• *T. longistyla* (Fraser, 1953)	Fragile Dropwing	LC		2	0	2	4
• *T. monardi* Ris, 1931	Southern Fluttering Dropwing	LC		2	0	2	4
• *T. nuptialis* Karsch, 1894	Hairy-legged Dropwing	LC		2	0	0	2
• *T. osvaldae* D'Andrea & Carfi, 1997	Sombre Dropwing	LC		2	0	2	4
• *T. palustris* Damm & Hadrys, 2009	Marsh Dropwing	LC		2	0	2	4
• *T. pluvialis* Förster, 1906	Orange-red Dropwing (Riffle-and-Reed Dropwing)	LC		1	0	1	2
• *T. pruinata* Karsch, 1899	Cobalt Dropwing	LC		0	0	1	1
• *T. stictica* (Burmeister, 1839)	Jaunty Dropwing	LC		0	0	0	0
• *T. tropicana* Fraser, 1953	Eastern Mantled Dropwing	LC		2	0	1	3
• *T. werneri* Ris, 1912	Elegant Dropwing	LC		1	0	1	2
• *Trithetrum congoense* (Aguesse, 1966)	Sooty Darter	LC		2	0	1	3
• *T. navasi* (Lacroix, 1921)	Fiery Darter	LC		0	0	0	0
• *Urothemis assignata* (Sélys, 1872)	Red Basker	LC		0	0	0	0
• *U. edwardsii* (Sélys, 1849)	Blue Basker	LC		0	0	0	0
• *U. luciana* Balinsky, 1961	St Lucia Basker	LC		2	0	1	3

APPENDIX A3: (*continued*)

ANISOPTERA	DRAGONFLIES	Global RL category	Global RL criteria	Sub-indices			Species
				GD	TS	SV	ADBI
LIBELLULIDAE (*cont.*)	**SKIMMERS**						
• *Zygonoides fraseri* (Pinhey, 1956)	Northern Riverking (Robust Riverking)	LC		1	0	1	2
• *Z. fuelleborni* (Grünberg, 1902)	Southern Riverking	LC		1	0	1	2
• *Z. occidentis* (Ris, 1912)	Congo Riverking	LC		2	0	0	2
• *Zygonyx atritibiae* Pinhey, 1964	Viceroy Cascader	LC		2	0	1	3
• *Z. chrysobaphes* Ris, 1915	Golden-winged Cascader	LC		2	0	0	2
• *Z. eusebia* (Ris, 1912)	Imperial Cascader	LC		2	0	0	2
• *Z. flavicosta* (Sjöstedt, 1900)	Ensign Cascader	LC		1	0	1	2
• *Z. geminuncus* Legrand, 1997	Double-hooked Cascader	LC		2	0	2	4
• *Z. natalensis* (Martin, 1900)	Powdered Cascader (Blue Cascader)	LC		1	0	1	2
• *Z. regisalberti* (Schouteden, 1934)	Regal Cascader	LC		2	0	1	3
• *Z. speciosus* Karsch, 1891	Specious Cascader	LC		2	0	1	3
• *Z. torridus* (Kirby, 1889)	Ringed Cascader	LC		0	0	1	1
• *Zyxomma atlanticum* Sélys, 1889	Smoky Duskdarter	LC		1	0	2	3
LIBELLULOIDEA INCERTAE SEDIS	**EMERALDS**						
• *Idomacromia proavita* Karsch, 1896	Greater Shadowcruiser	LC		1	0	3	4
• *Neophya rutherfordi* Sélys, 1881	Feeblewing	LC		1	0	2	3
• *Syncordulia gracilis* (Burmeister, 1839)	Yellow Presba	VU	B2ab(i, ii, iii); D2	2	2	2	6
• *S. legator* Dijkstra *et al.*, 2007	Gilded Presba	VU	B2ab(iii)	3	2	2	7
• *S. serendipator* Dijkstra *et al.*, 2007	Rustic Presba	VU	B2ab(iii)	3	2	2	7
• *S. venator* (Barnard, 1933)	Mahogany Presba	VU	B2ab(i, ii, iii)	2	2	2	6

APPENDIX A3: (*continued*)

ANISOPTERA	DRAGONFLIES	Global RL category	Global RL criteria	Sub-indices			Species
				GD	TS	SV	ADBI
MACROMIIDAE	**EMERALDS**						
• *Phyllomacromia aeneothorax* (Nunney, 1895)	Western Bronze Cruiser	LC		2	0	2	4
• *P. aureozona* (Pinhey, 1966)	Golden-banded Cruiser	LC		2	0	2	4
• *P. bicristulata* (Legrand, 1975)	Gabon Double-spined Cruiser	LC		2	0	2	4
• *P. caneri* (Gauthier, 1987)	Gold-studded Cruiser	LC		3	0	2	5
• *P. contumax* Sélys, 1879	Two-banded Cruiser	LC		0	0	0	0
• *P. funicularioides* (Legrand, 1983)	Nimba Cruiser	NT		2	1	3	6
• *P. hervei* (Legrand, 1980)	River Cruiser	LC		1	0	0	1
• *P. insignis* (Kirby, 1889)	Golden-ringed Cruiser	LC		2	0	2	4
• *P. lamottei* (Legrand, 1993)	Western Double-spined Cruiser	NT		3	1	2	6
• *P. lieftincki* (Fraser, 1954)	Eastern Bronze Cruiser	LC		3	0	2	5
• *P. measi* (Schouteden, 1917)	Blackwater Cruiser	LC		2	0	1	3
• *P. melania* (Sélys, 1871)	Western Unicorn Cruiser	LC		1	0	2	3
• *P. monoceros* (Förster, 1906)	Eastern Unicorn Cruiser	LC		1	0	3	4
• *P. occidentalis* (Fraser, 1954)	Brown-templed Cruiser	LC		3	0	2	5
• *P. pallidinervis* (Förster, 1906)	Pale-veined Cruiser	LC		2	0	1	3
• *P. paula* (Karsch, 1892)	Greater Double-spined Cruiser	LC		2	0	1	3
• *P. picta* (Hagen in Sélys, 1871)	Darting Cruiser	LC		1	0	1	2
• *P. sophia* (Sélys, 1871)	Ebony Cruiser	LC		2	0	3	5
• *P. sylvatica* (Fraser, 1954)	Forest Cruiser	LC		2	0	3	5
• *P. unifasciata* (Fraser, 1954)	Golden-eyed Cruiser	LC		2	0	1	3

APPENDIX A3: (*continued*)

ZYGOPTERA	DAMSELFLIES	Global RL category	Global RL criteria	Sub-indices			Species
				GD	TS	SV	ADBI
ARGIOLESTIDAE	**FLATWINGS**						
• *Neurolestes nigeriensis* (Gambles, 1970)	Gamble's Flatwing	CR	B1ab(ii, iii)	3	3	3	9
• *N. trinervis* Sélys, 1885	Guinea Flatwing	LC		2	0	3	5
CALOPTERYGIDAE	**DEMOISELLES**						
• *Calopteryx exul* (Sélys, 1853)	Glittering Demoiselle	CR	B2ab(ii, iii, iv, v)	2	3	2	7
• *C. haemorrhoidalis* (Vander Linden, 1825)	Copper Demoiselle	LC		2	0	1	3
• *C. virgo* (Linnaeus, 1758)	Beautiful Demoiselle	LC		2	0	1	3
• *Phaon camerunensis* Sjöstedt, 1900	Forest Flashwing	LC		1	0	1	2
• *P. iridipennis* (Burmeister, 1839)	Common Flashwing	LC		0	0	0	0
• *Sapho bicolor* Sélys, 1853	Spring Bluewing	LC		1	0	3	4
• *S. ciliata* (Fabricius, 1781)	Western Bluewing	LC		2	0	1	3
• *S. fumosa* Longfield, 1932	Smokewing/Cloudwing/Mistwing	LC		2	0	2	4
• *S. gloriosa* McLachlan, 1873	Glorious Bluewing	LC		2	0	1	3
• *S. orichalcea* McLachlan, 1869		LC		2	0	1	3
• *S. puella* (Sjöstedt, 1917)	Clearwing	EN	B1ab(ii, iii) + 2ab(ii, iii)	3	3	3	9
• *Umma cincta* (Hagen in Sélys, 1853)	Broad-winged Sparklewing	LC		1	0	1	2
• *U. declivium* Förster, 1906	Green-banded Sparklewing	VU	B1ab(iii) + 2ab(iii)	2	2	2	6
• *U. electa* Longfield, 1933	Metallic Sparklewing	LC		2	0	1	3
• *U. longistigma* (Sélys, 1869)	Bare-bellied Sparklewing	LC		2	0	1	3
• *U. mesostigma* (Sélys, 1879)	Hairy-bellied Sparklewing	LC		2	0	2	4
• *U. mesumbei* Vick, 1996	Cameroon Sparklewing	EN	B1ab(ii, iii)	3	3	3	9
• *U. saphirina* Förster, 1916	Sapphire Sparklewing	LC		1	0	2	3
CHLOROCYPHIDAE	**JEWELS**						
• *Africocypha centripunctata* (Gambles, 1975)	Banded Jewel	VU	B1ab(iii) + 2ab(iii)	3	2	2	7
• *A. lacuselephantum* (Karsch, 1899)	Kaleidoscope Jewel	LC		2	0	1	3

APPENDIX A3: (*continued*)

ZYGOPTERA	DAMSELFLIES	Global RL category	Global RL criteria	Sub-indices			Species
				GD	TS	SV	ADBI
CHLOROCYPHIDAE (*cont.*)	**JEWELS**						
• *Chlorocypha aphrodite* (Le Roi, 1915)	Blue Jewel	LC		2	0	1	3
• *C. cancellata* (Sélys, 1879)	Exquisite Jewel	LC		2	0	2	4
• *C. consueta* (Karsch, 1899)	Ruby Jewel	LC		1	0	1	2
• *C. crocea* Longfield, 1947	Angola Jewel	LC		3	0	2	5
• *C. curta* (Hagen in Sélys, 1853)	Blue-tipped Jewel	LC		1	0	2	3
• *C. cyanifrons* (Sélys, 1873)	Blue-fronted Jewel	LC		1	0	3	4
• *C. dispar* (Palisot de Beauvois, 1807)	Little Red Jewel	LC		2	0	3	5
• *C. fabamacula* Pinhey, 1961	Spotted Jewel	LC		2	0	1	3
• *C. frigida* Pinhey, 1961	Frigid Jewel	LC		3	0	3	6
• *C. glauca* (Sélys, 1879)	Eastern Red-tipped Jewel	LC		2	0	2	4
• *C. helenae* Legrand, 1984	Sunset Jewel	NT		3	1	2	6
• *C. luminosa* (Karsch, 1893)	Orange Jewel	LC		2	0	2	4
• *C. neptunus* (Sjöstedt, 1900)	Dull Jewel	DD		3	1	1	5
• *C. pyriformosa* Fraser, 1947	River Jewel	LC		1	0	1	2
• *C. radix* Longfield, 1959	Western Red-tipped Jewel	LC		2	0	2	4
• *C. rubida* (Hagen in Sélys, 1853)	Rosy Jewel	LC		1	0	3	4
• *C. selysi* (Karsch, 1899)	Blue-faced Jewel	LC		2	0	3	5
• *C. trifaria* (Karsch, 1899)	Blue-nosed Jewel	LC		2	0	3	5
• *C. victoriae* (Förster, 1914)	Victoria's Jewel	LC		2	0	1	3
• *C. wittei* Fraser, 1955	Katanga Jewel	LC		3	0	1	4
• *Platycypha amboniensis* (Martin, 1915)	Kenya Jewel	CR	B1ab(iii) + 2ab(iii)	3	3	2	8
• *P. angolensis* Longfield, 1959	Angola Dancing Jewel	NT		2	1	2	5
• *P. auripes* (Förster, 1906)	Tanzania Jewel	EN	B1ab(iii) + B2ab(iii)	3	3	3	9

APPENDIX A3: (*continued*)

ZYGOPTERA	DAMSELFLIES	Global RL category	Global RL criteria	Sub-indices			Species
				GD	TS	SV	ADBI
CHLOROCYPHIDAE (*cont.*)	**JEWELS**						
• *Platycypha caligata* (Sélys, 1853)	(Common) Dancing Jewel	LC		1	0	1	2
• *P. eliseva* Dijkstra, 2008	Lucifer Jewel	LC		3	0	1	4
• *P. fitzsimonsi* (Pinhey, 1950)	Boulder Jewel	LC		2	0	1	3
• *P. inyangae* Pinhey, 1958	Inyanga Jewel	VU	B2ab(ii, iii)	3	2	1	6
• *P. lacustris* (Förster, 1914)	Forest Jewel	LC		1	0	2	3
• *P. picta* (Pinhey, 1962)	Petite Jewel	LC		2	0	1	3
• *P. pinheyi* Fraser, 1950	Tanganyika Jewel	NT		3	1	2	6
• *P. rufitibia* (Pinhey, 1961)	Beautiful Jewel	LC		2	0	1	3
• *Stenocypha gracilis* (Karsch, 1899)	Graceful Jewel	LC		2	0	2	4
• *S. jacksoni* (Pinhey, 1952)	Yellow-sided Jewel	NT		3	1	2	6
• *S. molindica* (Fraser, 1948)	Bow-faced Jewel	NT		3	1	3	7
• *S. tenuis* (Longfield, 1936)	Slender Jewel	LC		2	0	2	4
COENAGRIONIDAE	**POND DAMSELS**						
• *Aciagrion africanum* Martin, 1908	Blue Slim	LC		1	0	1	2
• *A. balachowskyi* Legrand, 1982	Gabon Slim	LC		3	0	3	6
• *A. brosseti* Legrand, 1982	Yellow-winged Slim	LC		2	0	1	3
• *A. dondoense* Dijkstra, 2007	Opal Slim	LC		2	0	1	3
• *A. gracile* (Sjöstedt, 1909)	Graceful Slim (Emerald-striped Slim)	LC		1	0	1	2
• *A. heterostictum* Fraser, 1955	Long Slim	LC		2	0	0	2
• *A. nodosum* (Pinhey, 1964)	Cryptic Slim	LC		2	0	2	4
• *A. steeleae* Kimmins, 1955	Swamp Slim	LC		2	0	2	4
• *Africallagma cuneistigma* (Pinhey, 1969)	Chimanimani Bluet	NT		3	1	2	6
• *A. elongatum* (Martin, 1907)	Northern Slender Bluet	LC		2	0	1	3
• *A. fractum* (Ris, 1921)	Southern Slender Bluet	LC		2	0	2	4

APPENDIX A3: (*continued*)

ZYGOPTERA	DAMSELFLIES	Global RL category	Global RL criteria	Sub-indices			Species
				GD	TS	SV	ADBI
COENAGRIONIDAE (*cont.*)	**POND DAMSELS**						
• *Africallagma glaucum* (Burmeister, 1839)	Swamp Bluet	LC		1	0	2	3
• *A. pallidulum* Dijkstra, 2007	Little Bluet	LC		2	0	2	4
• *A. pseudelongatum* (Longfield, 1936)	Spotted Bluet	LC		2	0	1	3
• *A. sapphirinum* (Pinhey, 1950)	Sapphire Bluet	LC		2	0	1	3
• *A. sinuatum* (Ris, 1921)	Peak Bluet	LC		2	0	2	4
• *A. subtile* (Ris, 1921)	Fragile Bluet	LC		0	0	0	0
• *A. vaginale* (Sjöstedt, 1917)	Forest Bluet	LC		1	0	1	2
• *Agriocnemis angolensis* Longfield, 1947	Blue Wisp	LC		2	0	2	4
• *A. angustirami* Pinhey, 1974	Liberian Wisp	LC		3	0	1	4
• *A. bumhilli* Kipping *et al.*, 2012	Bumhill Wisp	NT		2	1	2	5
• *A. exilis* Sélys, 1872	Little Wisp	LC		0	0	1	1
• *A. falcifera* Pinhey, 1959	White-masked Wisp	LC		2	0	1	3
• *A. forcipata* Le Roi, 1915	Greater Pincer-tailed Wisp	LC		2	0	1	3
• *A. gratiosa* Gerstäcker, 1891	Gracious Wisp	LC		1	0	1	2
• *A. inversa* Karsch, 1899	Highland Wisp	LC		2	0	2	4
• *A. maclachlani* Sélys, 1877	Forest Wisp	LC		1	0	1	2
• *A. palaeforma* Pinhey, 1959	Papyrus Wisp	EN	B2ab(iii)	3	3	2	8
• *A. pinheyi* Balinsky, 1963	Pinhey's Wisp	LC		2	0	1	3
• *A. ruberrima* Balinsky, 1961	Orange Wisp	LC		2	0	2	4
• *A. sania* Nielsen, 1959	Nile Wisp	LC		1	0	2	3
• *A. stygia* Fraser, 1954	Congo Wisp	LC		2	0	3	5
• *A. victoria* Fraser, 1928	Lesser Pincer-tailed Wisp	LC		0	0	1	1
• *A. zerafica* Le Roi, 1915	Sahel Wisp	LC		0	0	1	1

APPENDIX A3: (*continued*)

ZYGOPTERA	DAMSELFLIES	Global RL category	Global RL criteria	Sub-indices			Species
				GD	TS	SV	ADBI
COENAGRIONIDAE (*cont.*)	**POND DAMSELS**						
• *Azuragrion buchholzi* (Pinhey, 1971)	Forest Azuret	LC		2	0	1	3
• *A. nigridorsum* (Sélys, 1876)	Sailing Azuret	LC		1	0	1	2
• *A. vansomereni* (Pinhey, 1956)	Tiny Azuret	LC		0	0	0	0
• *Ceriagrion annulatum* Fraser, 1955	Green-eyed Waxtail	LC		2	0	2	4
• *C. bakeri* Fraser, 1941	Blue-fronted Waxtail	LC		1	0	1	2
• *C. corallinum* Campion, 1914	Green-fronted Waxtail	LC		0	0	0	0
• *C. glabrum* (Burmeister, 1839)	Common Waxtail	LC		0	0	0	0
• *C. ignitum* Campion, 1914	Little Red Waxtail	LC		2	0	1	3
• *C. katamborae* Pinhey, 1961	White-faced Waxtail	LC		2	0	2	4
• *C. kordofanicum* Ris, 1924	Little Orange Waxtail	LC		2	0	2	4
• *C. platystigma* Fraser, 1941	Variable Waxtail	LC		1	0	1	2
• *C. rubellocerinum* Fraser, 1947	Red-tipped Waxtail	LC		2	0	2	4
• *C. sakejii* Pinhey, 1963	Cream-sided Waxtail	LC		2	0	1	3
• *C. suave* Ris, 1921	Plain Waxtail	LC		0	0	1	1
• *C. tenellum* (Villers, 1789)	Small Red Damsel	LC		2	0	2	4
• *C. tricrenaticeps* Legrand, 1984	Fiery Waxtail	LC		1	0	1	2
• *C. varians* (Martin, 1908)	Orange-red Waxtail	LC		2	0	2	4
• *C. whellani* Longfield, 1952	Yellow-faced Waxtail	LC		1	0	1	2
• *Coenagrion caerulescens* (Fonscolombe, 1838)	Mediterranean Bluet	LC		2	0	2	4
• *C. mercuriale* (Charpentier, 1840)	Mercury Bluet	NT		2	1	2	5
• *C. puella* (Linnaeus, 1758)	Azure Bluet	LC		2	0	2	4
• *C. scitulum* (Rambur, 1842)	Dainty Bluet	LC		2	0	2	4
• *Coryphagrion grandis* Morton, 1924	East Coast Giant	VU	B2ab(ii, iii)	2	2	3	7
• *Enallagma deserti* (Sélys, 1871)	Desert Bluet	LC		2	0	2	4

APPENDIX A3: (*continued*)

ZYGOPTERA	DAMSELFLIES	Global RL category	Global RL criteria	Sub-indices			Species
				GD	TS	SV	ADBI
COENAGRIONIDAE (*cont.*)	**POND DAMSELS**						
• *Erythromma lindenii* (Sélys, 1840)	Blue-eye	LC		2	0	2	4
• *E. viridulum* (Charpentier, 1840)	Small Red-eye	LC		2	0	2	4
• *Ischnura abyssinica* Martin, 1907	Ethiopian Bluetail	NT		3	1	2	6
• *I. evansi* Morton, 1919	Desert Bluetail	LC		2	0	2	4
• *I. fountaineae* Morton, 1905	Oasis Bluetail	LC		1	0	2	3
• *I. graellsii* (Rambur, 1842)	Spanish Bluetail	LC		2	0	2	4
• *I. pumilio* (Charpentier, 1825)	Small Bluetail	LC		2	0	2	4
• *I. saharensis* Aguesse, 1958	Sahara Bluetail	LC		1	0	2	3
• *I. senegalensis* (Rambur, 1842)	Tropical Bluetail (Marsh Bluetail)	LC		0	0	1	1
• *Oreocnemis phoenix* Pinhey, 1971	Mulanje Damsel	CR	B1ab(iii) + 2ab(iii)	3	3	3	9
• *Pinheyagrion angolicum* (Pinhey, 1966)	Pinhey's Bluet	LC		2	0	2	4
• *Proischnura polychromatica* (Barnard, 1937)	Mauve Bluet	EN	B1ab(i, ii, iii, iv) + B2ab(i, ii, iii, iv)	3	3	2	8
• *P. rotundipennis* (Ris, 1921)	Round-winged Bluet	LC		2	0	2	4
• *P. subfurcata* (Sélys, 1876)	Fork-tailed Bluet	LC		1	0	1	2
• *Pseudagrion acaciae* Förster, 1906	Rusty-fronted Sprite (Acacia Sprite)	LC		1	0	1	2
• *P. angolense* Sélys, 1876	Angola Sprite	NT		2	1	1	4
• *P. assegaii* Pinhey, 1950	Assegai Sprite (Spearhead Sprite)	LC		1	0	2	3
• *P. bernardi* Terzani & Carletti, 2001	Batéké Sprite	LC		3	0	0	3
• *P. bicoerulans* Martin, 1907	Giant Sprite	VU	B1ab(iii)	3	2	1	6
• *P. caffrum* (Burmeister, 1839)	Springwater Sprite	LC		2	0	2	4
• *P. camerunense* (Karsch, 1899)	Yellow-fronted Sprite	LC		1	0	0	1
• *P. citricola* Barnard, 1937	Yellow-faced Sprite	LC		2	0	2	4
• *P. coeleste* Longfield, 1947	Catshead Sprite	LC		1	0	1	2
• *P. coeruleipunctum* Pinhey, 1964	Pretty Sprite	LC		2	0	2	4

APPENDIX A3: (*continued*)

ZYGOPTERA	DAMSELFLIES	Global RL category	Global RL criteria	Sub-indices			Species
				GD	TS	SV	ADBI
COENAGRIONIDAE (*cont.*)	**POND DAMSELS**						
• *Pseudagrion commoniae* (Förster, 1902)	Black Sprite	LC		1	0	2	3
• *P. cyathiforme* Pinhey, 1973	Scoop-tailed Sprite	LC		3	0	1	4
• *P. deningi* Pinhey, 1961	Dark Sprite	LC		2	0	2	4
• *P. draconis* Barnard, 1937	Mountain Sprite	LC		2	0	2	4
• *P. emarginatum* Karsch, 1893	Blue-faced Sprite	LC		1	0	2	3
• *P. epiphonematicum* Karsch, 1891	Exclamation Sprite	LC		1	0	2	3
• *P. estesi* Pinhey, 1971	Estes's Sprite	LC		2	0	1	3
• *P. fisheri* Pinhey, 1961	Dark-tailed Sprite	LC		2	0	1	3
• *P. furcigerum* (Rambur, 1842)	Palmiet Sprite	LC		2	0	1	3
• *P. gamblesi* Pinhey, 1978	Eastern Great Sprite	LC		1	0	1	2
• *P. gigas* Ris, 1936	Western Great Sprite	LC		2	0	1	3
• *P. glaucescens* Sélys, 1876	Blue-green Sprite	LC		0	0	1	1
• *P. glaucoideum* Schmidt in Ris, 1936	Cryptic Sprite	LC		1	0	0	1
• *P. glaucum* (Sjöstedt, 1900)	Slender Sprite	LC		1	0	1	2
• *P. greeni* Pinhey, 1961	Clasper-tailed Sprite	LC		2	0	1	3
• *P. grilloti* Legrand, 1987	Orange-striped Sprite	LC		3	0	3	6
• *P. guichardi* Kimmins, 1958	Ethiopian Sprite	VU	B1ab(iii)	3	2	2	7
• *P. hageni* Karsch, 1893	Painted Sprite	LC		1	0	1	2
• *P. hamoni* Fraser, 1955	Swarthy Sprite (Drab Sprite)	LC		0	0	1	1
• *P. helenae* Balinsky, 1964	Little Blue Sprite	LC		2	0	1	3
• *P. hemicolon* Karsch, 1899	Semicolon Slimsprite	LC		1	0	3	4
• *P. inconspicuum* Ris, 1931	Little Sprite	LC		2	0	1	3
• *P. inopinatum* Balinsky, 1971	Balinsky's Sprite (Badplaas Sprite)	NT		3	1	1	5
• *P. isidromorai* Compte Sart, 1967	Large Blue Sprite	LC		1	0	1	2

APPENDIX A3: (*continued*)

ZYGOPTERA	DAMSELFLIES	Global RL category	Global RL criteria	Sub-indices			Species
				GD	TS	SV	ADBI
COENAGRIONIDAE (*cont.*)	**POND DAMSELS**						
• *Pseudagrion kaffinum* Consiglio, 1978	Kaffa Sprite	VU	B1ab(i, ii, iii)	3	2	1	6
• *P. kersteni* (Gerstäcker, 1869)	Powder-faced Sprite (Kersten's Sprite)	LC		0	0	1	1
• *P. kibalense* Longfield, 1959	Forest Sprite	LC		2	0	2	4
• *P. lindicum* Grünberg, 1902	Eastern Blue Sprite	LC		1	0	2	3
• *P. makabusiense* Pinhey, 1950	Green-striped Sprite	LC		2	0	1	3
• *P. malagasoides* Pinhey, 1973	Floodforest Sprite	LC		1	0	2	3
• *P. massaicum* Sjöstedt, 1909	Red-fronted Sprite	LC		1	0	2	3
• *P. melanicterum* Sélys, 1876	Farmbush Sprite	LC		0	0	0	0
• *P. newtoni* Pinhey, 1962	Harlequin Sprite	VU	D2	3	2	2	7
• *P. niloticum* Dumont, 1978	Nile Sprite	LC		1	0	2	3
• *P. nubicum* Sélys, 1876	Bluetail Sprite	LC		0	0	0	0
• *P. risi* Schmidt in Ris, 1936	Cameroon Sprite	LC		3	0	1	4
• *P. rufocinctum* Pinhey, 1956	Albertine Sprite	LC		2	0	3	5
• *P. rufostigma* Longfield, 1947	Ruby Sprite	LC		2	0	1	3
• *P. salisburyense* Ris, 1921	Slate Sprite	LC		1	0	1	2
• *P. serrulatum* Karsch, 1894	Superb Sprite	LC		2	0	1	3
• *P. simonae* Legrand, 1987	Wide-striped Sprite	LC		2	0	2	4
• *P. simplicilaminatum* Carletti & Terzani, 1997	Blue Slimsprite	LC		2	0	0	2
• *P. sjoestedti* Förster, 1906	Variable Sprite (Rufous Sprite)	LC		0	0	1	1
• *P. spernatum* Sélys, 1881	Upland Sprite (Powder Sprite)	LC		1	0	1	2
• *P. sublacteum* (Karsch, 1893)	Cherry-eye Sprite	LC		0	0	1	1
• *P. sudanicum* Le Roi, 1915	Changeable Sprite (Sudan Sprite)	LC		1	0	1	2
• *P. symoensii* Pinhey, 1967	Katanga Sprite	VU	B1a + B2ab(ii, iii)	3	2	1	6
• *P. thenartum* Fraser, 1955	Orange Slimsprite	LC		2	0	3	5

APPENDIX A3: (*continued*)

ZYGOPTERA	DAMSELFLIES	Global RL category	Global RL criteria	Sub-indices			Species
				GD	TS	SV	ADBI
COENAGRIONIDAE (*cont.*)	**POND DAMSELS**						
• *Pseudagrion torridum* Sélys, 1876	Wing-tailed Sprite	LC		0	0	1	1
• *P. vaalense* Chutter, 1962	Vaal Sprite	LC		2	0	1	3
• *P. vumbaense* Balinsky, 1963	Vumba Sprite	NT		3	1	2	6
• *Pyrrhosoma nymphula* (Sulzer, 1776)	Large Red Damsel	LC		2	0	2	4
• *Teinobasis alluaudi* (Martin, 1896)	Indian Ocean Fineliner	LC		2	0	2	4
LESTIDAE	**SPREADWINGS**						
• *Chalcolestes viridis* (Vander Linden, 1825)	Western Willow Spreadwing	LC		2	0	1	3
• *Lestes amicus* Martin, 1910	Yellow-winged Spreadwing	LC		2	0	1	3
• *L. barbarus* (Fabricius, 1798)	Migrant Spreadwing	LC		2	0	2	4
• *L. dissimulans* Fraser, 1955	Cryptic Spreadwing	LC		0	0	0	0
• *L. dryas* Kirby, 1890	Robust Spreadwing	LC		3	0	2	5
• *L. ictericus* Gerstäcker, 1869	Tawny Spreadwing	LC		0	0	1	1
• *L. numidicus* Samraoui *et al.*, 2003	Late Spreadwing	DD		3	1	1	5
• *L. ochraceus* Sélys, 1862	Ochre Spreadwing	LC		0	0	1	1
• *L. pallidus* Rambur, 1842	Pallid Spreadwing (Pale Spreadwing)	LC		0	0	1	1
• *L. pinheyi* Fraser, 1955	Pinhey's Spreadwing	LC		1	0	1	2
• *L. plagiatus* (Burmeister, 1839)	Highland Spreadwing	LC		1	0	1	2
• *L. tridens* McLachlan, 1895	Spotted Spreadwing	LC		0	0	0	0
• *L. uncifer* Karsch, 1899	Sickle Spreadwing	LC		1	0	1	2
• *L. virens* (Charpentier, 1825)	Small Spreadwing	LC		1	0	1	2
• *L. virgatus* (Burmeister, 1839)	Smoky Spreadwing	LC		1	0	1	2
• *Sympecma fusca* (Vander Linden, 1820)	Common Winterdamsel	LC		1	0	1	2
PENTAPHLEBIIDAE							
• *Pentaphlebia stahli* Förster, 1909	Red Relic	VU	B1ab(iii)	3	2	2	7

APPENDIX A3: (*continued*)

ZYGOPTERA	DAMSELFLIES	Global RL category	Global RL criteria	Sub-indices			Species
				GD	TS	SV	ADBI
PLATYCNEMIDIDAE	**FEATHERLEGS**						
• *Allocnemis abbotti* (Calvert, 1892)	Eastern Yellowwing	NT		2	1	2	5
• *A. contraria* (Schmidt, 1951)	Flame-backed Yellowwing	LC		2	0	2	4
• *A. cyanura* (Förster, 1909)	Blue-tipped Yellowwing	LC		2	0	3	5
• *A. elongata* (Hagen in Sélys, 1863)	Orange-legged Yellowwing	LC		2	0	2	4
• *A. flavipennis* (Sélys, 1863)	Amber Yellowwing	LC		2	0	2	4
• *A. leucosticta* (Sélys, 1863)	Goldtail (Yellowwing)	LC		2	0	3	5
• *A. marshalli* (Ris, 1921)	Blue Yellowwing	LC		2	0	3	5
• *A. mitwabae* Pinhey, 1961	Katanga Yellowwing	VU	B1ab(ii, iii) + B2ab(ii, iii)	3	2	2	7
• *A. nigripes* (Sélys, 1886)	Rainbow Yellowwing	LC		2	0	2	4
• *A. pauli* (Longfield, 1936)	Orange-tipped Yellowwing	LC		2	0	2	4
• *A. subnodalis* (Sélys, 1886)	Blue-legged Yellowwing	LC		2	0	3	5
• *A. superba* (Schmidt, 1951)	Superb Yellowwing	LC		2	0	2	4
• *A. wittei* (Fraser, 1955)	Blue-spotted Yellowwing	LC		2	0	2	4
• *Copera congolensis* (Martin, 1908)	Congo Featherleg	LC		2	0	2	4
• *C. guttifera* (Fraser, 1950)	Western Featherleg	LC		2	0	2	4
• *C. nyansana* (Förster, 1916)	Eastern Featherleg	LC		2	0	2	4
• *C. rufipes* (Sélys, 1886)	Rusty Featherleg	LC		2	0	2	4
• *C. sikassoensis* (Martin, 1912)	Little Featherleg	LC		0	0	0	0
• *Elattoneura acuta* Kimmins, 1938	Red Threadtail	LC		2	0	3	5
• *E. balli* Kimmins, 1938	Western Stream Threadtail	LC		2	0	2	4
• *E. cellularis* (Grünberg, 1902)	Zambezi Threadtail	LC		2	0	1	3
• *E. centrafricana* Lindley, 1976	Black-shouldered Threadtail	LC		2	0	2	4
• *E. frenulata* (Hagen in Sélys, 1860)	Sooty Threadtail	LC		2	0	2	4
• *E. girardi* Legrand, 1980	Candy Threadtail	LC		2	0	1	3

APPENDIX A3: (*continued*)

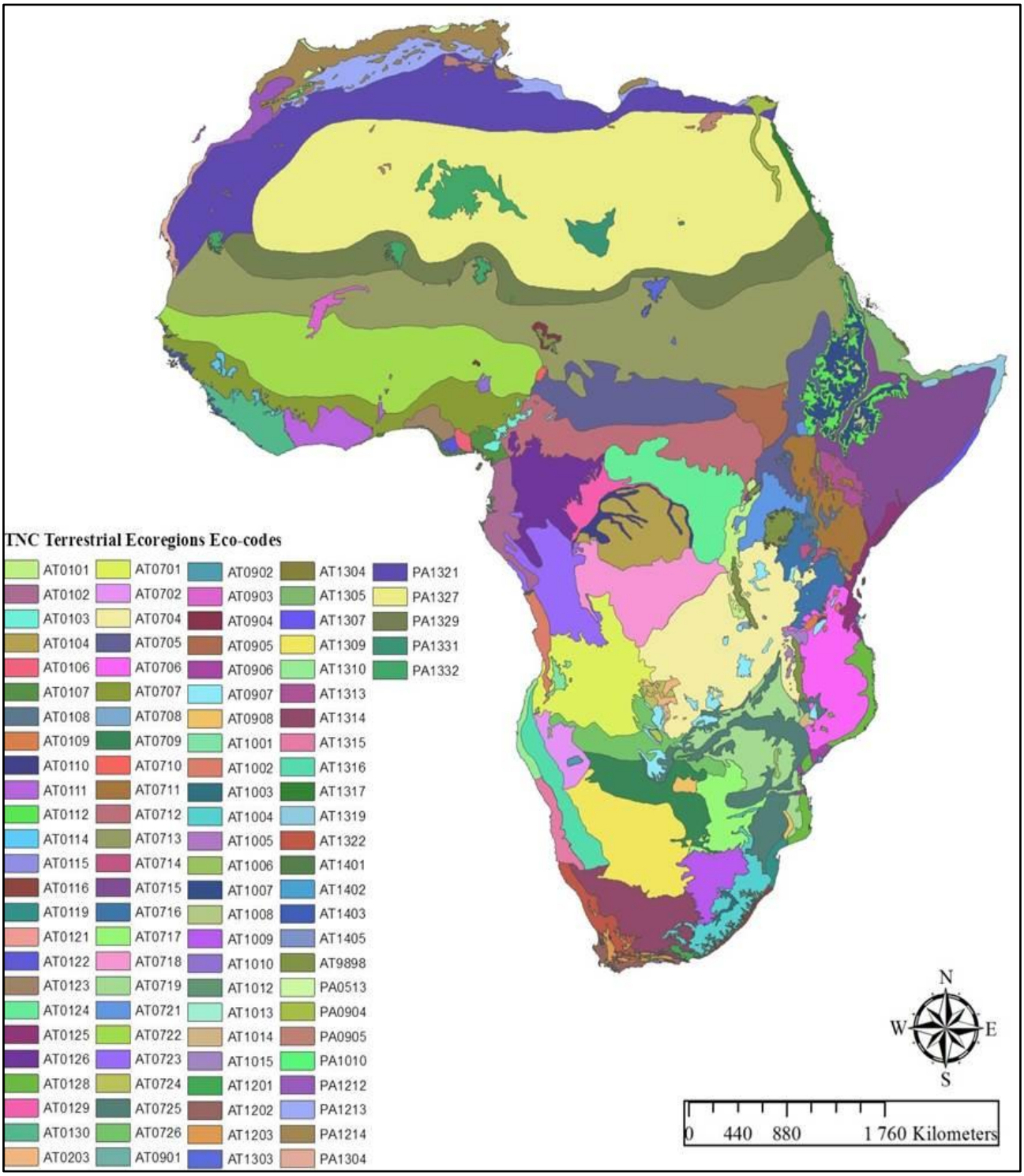
ZYGOPTERA	DAMSELFLIES	Global RL category	Global RL criteria	Sub-indices			Species
				GD	TS	SV	ADBI
PLATYCNEMIDIDAE (*cont.*)	**FEATHERLEGS**						
• *Elattoneura glauca* (Sélys, 1860)	Common Threadtail	LC		1	0	1	2
• *E. incerta* (Pinhey, 1962)	Swamp Threadtail	LC		2	0	1	3
• *E. josemorai* Compte Sart, 1964	Gabon Threadtail	LC		2	0	2	4
• *E. lindleyi* Legrand, 1980	Dusky Threadtail	LC		2	0	1	3
• *E. lliba* Legrand, 1985	Eastern Stream Threadtail	LC		2	0	2	4
• *E. mayombensis* Legrand, 1985	Black-fronted Threadtail	LC		2	0	2	4
• *E. morini* Legrand, 1985	Mealy Threadtail	LC		2	0	3	5
• *E. nigra* Kimmins, 1938	Black Threadtail	LC		1	0	0	1
• *E. pasquinii* Consiglio, 1978	Ethiopian Threadtail	VU	B1ab(iii)	3	2	1	6
• *E. pruinosa* (Sélys, 1886)	Cameroon Threadtail	LC		3	0	2	5
• *E. tsiamae* Aguesse, 1966	Rusty Threadtail	LC		3	0	0	3
• *E. villiersi* (Fraser, 1948)	White-shouldered Threadtail	LC		2	0	2	4
• *E. vittata* (Sélys, 1886)	Western Red-banded Threadtail	LC		1	0	3	4
• *E. vrijdaghi* Fraser, 1954	Ochre Threadtail	LC		2	0	0	2
• *Mesocnemis robusta* (Sélys, 1886)	Northern Riverjack	LC		1	0	2	3
• *M. saralisa* Dijkstra, 2008	Congo Riverjack	LC		2	0	1	3
• *M. singularis* Karsch, 1891	Common (Forest/Savanna) Riverjack	LC		0	0	0	0
• *M. tisi* Lempert, 1992	Sinoe Riverjack	EN	B1ab(ii, iii)	3	3	2	8
• *Metacnemis valida* (Hagen in Sélys, 1863)	Blue Riverjack (Kubusi Streamjack)	EN	A2c; B1ab(i, ii, iii) + B2ab(i, ii, iii)	3	3	3	9
• *Platycnemis subdilatata* Sélys, 1849	Barbary Featherleg	LC		2	0	1	3
• *Spesbona angusta* (Sélys, 1863)	Ceres Streamjack	EN	D2; B2ab(ii)	3	3	2	8
• *Stenocnemis pachystigma* (Sélys, 1886)	Tricklejack, Falljack, Sprayjack	LC		2	0	2	4

APPENDIX A3: (*continued*)

ZYGOPTERA	DAMSELFLIES	Global RL category	Global RL criteria	Sub-indices			Species
				GD	TS	SV	ADBI
SYNLESTIDAE	**MALACHITES**						
• *Chlorolestes apricans* Wilmot, 1975	Amatola Malachite (Basking Malachite)	EN	B2ab(i, ii, iii, iv)	3	3	2	8
• *C. conspicuus* Hagen in Sélys, 1862	Conspicuous Malachite	LC		2	0	2	4
• *C. draconicus* Balinsky, 1956	Drakensberg Malachite	LC		3	0	2	5
• *C. elegans* Pinhey, 1950	Elegant Malachite	NT		2	1	2	5
• *C. fasciatus* (Burmeister, 1839)	Mountain Malachite	LC		2	0	2	4
• *C. tessellatus* (Burmeister, 1839)	Forest Malachite	LC		2	0	2	4
• *C. umbratus* Hagen in Sélys, 1862	White Malachite	LC		2	0	2	4
• *Ecchlorolestes nylephtha* (Barnard, 1937)	Queen Malachite	NT		3	1	3	7
• *E. peringueyi* (Ris, 1921)	Rock Malachite (Marbled Malachite)	NT		3	1	2	6
• *Nubiolestes diotima* (Schmidt, 1943)	African Twigtail (Rainforest Malachite)	LC		2	0	2	4
ZYGOPTERA INCERTAE SEDIS							
• *Amanipodagrion gilliesi* Pinhey, 1962	Amani Flatwing	CR	B1ab(iii) + 2ab(iii); C2a(ii)	3	3	3	9

APPENDIX A4: The 105 terrestrial ecoregions of Africa.

The 105 terrestrial ecoregions of the African continent, as established by The Nature Conservancy (2013), is shown here according to their eco-codes. The terrestrial ecoregions that only encompasses the African continent were used when creating the map. Excluded were all the terrestrial ecoregions representing the islands that occur around the continent (e.g. Madagascar, Seychelles, Mauritius, Cape Verde, and Sao Tome and Principe Islands). Below is the list of the eco-codes with their respective eco-names, as illustrated in the map.



APPENDIX A4: (*continued*)

Eco-code	Eco-name	Eco-code	Eco-name
AT0101	Albertine Rift Montane Forests	AT0701	Angolan Miombo Woodlands
AT0102	Atlantic Equatorial Coastal Forests	AT0702	Angolan Mopane Woodlands
AT0103	Cameroonian Highlands Forests	AT0704	Central Zambezian Miombo Woodlands
AT0104	Central Congolian Lowland Forests	AT0705	East Sudanian Savanna
AT0106	Cross-Niger Transition Forests	AT0706	Eastern Miombo Woodlands
AT0107	Cross-Sanaga-Bioko Coastal Forests	AT0707	Guinean Forest-Savanna Mosaic
AT0108	East African Montane Forests	AT0708	Itigi-Sumba Thicket
AT0109	Eastern Arc Forests	AT0709	Kalahari Acacia-Baikiaea Woodlands
AT0110	Eastern Congolian Swamp Forests	AT0710	Mandara Plateau Mosaic
AT0111	Eastern Guinean Forests	AT0711	Northern Acacia-Commiphora Bushlands and Thickets
AT0112	Ethiopian Montane Forests	AT0712	Northern Congolian Forest-Savanna Mosaic
AT0114	Guinean Montane Forests	AT0713	Sahelian Acacia Savanna
AT0115	Knysna-Amatole Montane Forests	AT0714	Serengeti Volcanic Grasslands
AT0116	KwaZulu-Cape Coastal Forest Mosaic	AT0715	Somali Acacia-Commiphora Bushlands and Thickets
AT0119	Maputaland Coastal Forest Mosaic	AT0716	Southern Acacia-Commiphora Bushlands and Thickets
AT0121	Mount Cameroon and Bioko Montane Forests	AT0717	Southern Africa Bushveld
AT0122	Niger Delta Swamp Forests	AT0718	Southern Congolian Forest-Savanna Mosaic
AT0123	Nigerian Lowland Forests	AT0719	Southern Miombo Woodlands
AT0124	Northeastern Congolian Lowland Forests	AT0721	Victoria Basin Forest-Savanna Mosaic
AT0125	Northern Zanzibar-Inhambane Coastal Forest Mosaic	AT0722	West Sudanian Savanna
AT0126	Northwestern Congolian Lowland Forests	AT0723	Western Congolian Forest-Savanna Mosaic
AT0128	Southern Zanzibar-Inhambane Coastal Forest Mosaic	AT0724	Western Zambezian Grasslands
AT0129	Western Congolian Swamp Forests	AT0725	Zambezian and Mopane Woodlands
AT0130	Western Guinean Lowland Forests	AT0726	Zambezian Baikiaea Woodlands
AT0203	Zambezian Cryptosephalum Dry Forests	AT0901	East African Halophytics

APPENDIX A4: (*continued*)

Eco-code	Eco-name	Eco-code	Eco-name
AT0902	Etosha Pan Halophytics	AT1203	Montane Fynbos and Renosterveld
AT0903	Inner Niger Delta Flooded Savanna	AT1303	East Saharan Montane Xeric Woodlands
AT0904	Lake Chad Flooded Savanna	AT1304	Eritreaen Coastal Desert
AT0905	Saharan Flooded Grasslands	AT1305	Ethiopian Xeric Grasslands and Shrublands
AT0906	Zambezian Coastal Flooded Savanna	AT1307	Hobyo Grasslands and Shrublands
AT0907	Zambezian Flooded Grasslands	AT1309	Kalahari Xeric Savanna
AT0908	Zambezian Halophytics	AT1310	Kaokoveld Desert
AT1001	Angolan Montane Forest-Grassland Mosaic	AT1313	Masai Xeric Grasslands and Shrublands
AT1002	Angolan Scarp Savanna and Woodlands	AT1314	Nama Karoo
AT1003	Drakensberg Alti-Montane Grasslands and Woodlands	AT1315	Namib Desert
AT1004	Drakensberg Montane Grasslands, Woodlands and Forests	AT1316	Namibian Savanna Woodlands
AT1005	East African Montane Moorlands	AT1317	Red Sea Coastal Desert
AT1006	Eastern Zimbabwe Montane Forest-Grassland Mosaic	AT1319	Somali Montane Xeric Woodlands
AT1007	Ethiopian Montane Grasslands and Woodlands	AT1322	Succulent Karoo
AT1008	Ethiopian Montane Moorlands	AT1401	Central African Mangroves
AT1009	Highveld Grasslands	AT1402	East African Mangroves
AT1010	Jos Plateau Forest-Grassland Mosaic	AT1403	Guinean Mangroves
AT1012	Maputaland-Pondoland Bushveld and Thickets	AT1405	Southern African Mangroves
AT1013	Ruwenzori-Virunga Montane Moorlands	AT9898	Lake: Afrotropic
AT1014	South Malawi Montane Forest-Grassland Mosaic	PA0513	Mediterranean Conifer and Mixed Forests
AT1015	Southern Rift Montane Forest-Grassland Mosaic	PA0904	Nile Delta Flooded Savanna
AT1201	Albany Thickets	PA0905	Saharan Halophytics
AT1202	Lowland Fynbos and Renosterveld	PA1010	Mediterranean High Atlas Juniper Steppe

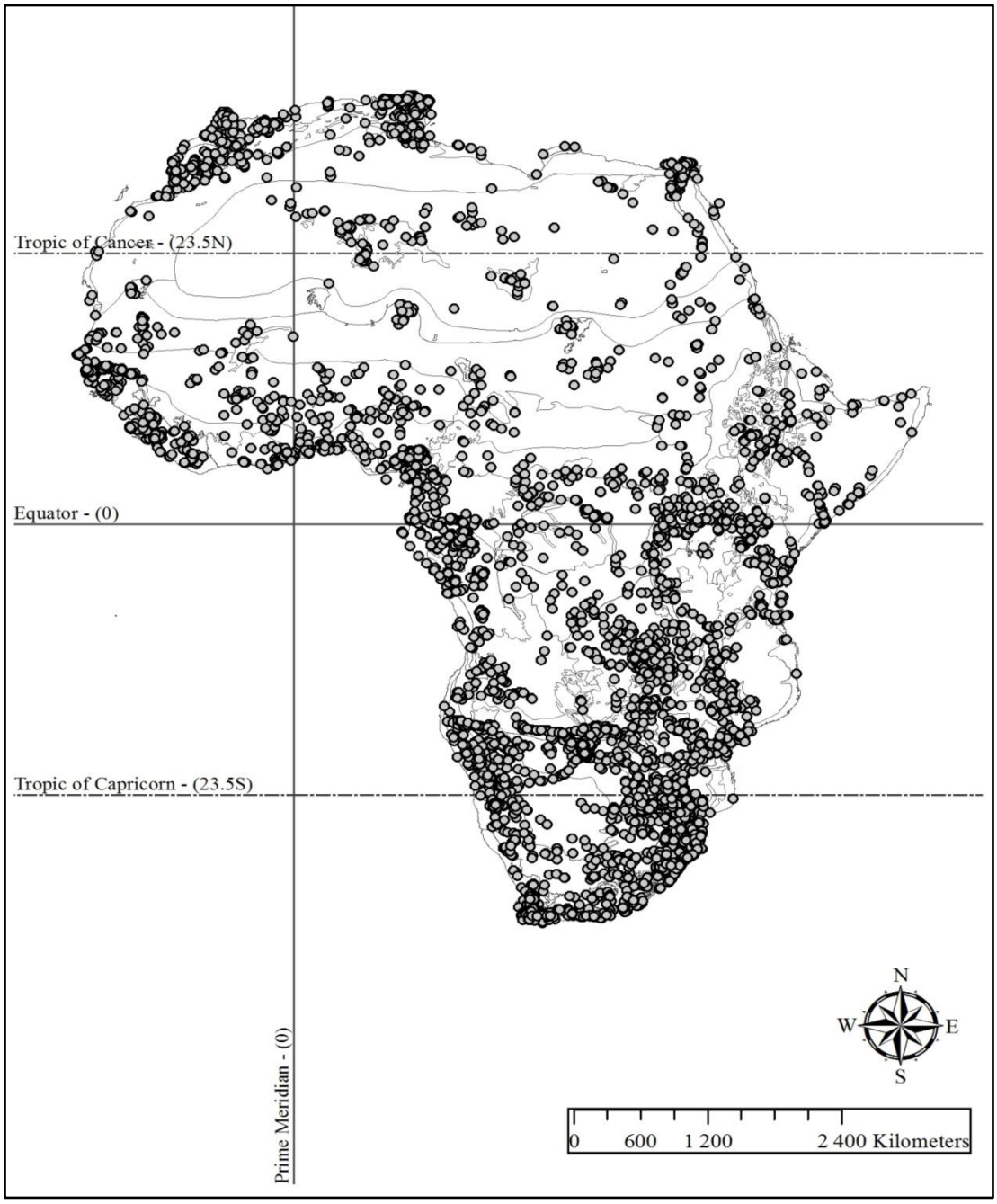
APPENDIX A4: (*continued*)

Eco-code	Eco-name	Eco-code	Eco-name
PA1212	Mediterranean Acacia-Argania Dry Woodlands and Succulent Thickets	PA1327	Sahara Desert
PA1213	Mediterranean Dry Woodlands and Steppe	PA1329	South Saharan Steppe and Woodlands
PA1214	Mediterranean Woodlands and Forests	PA1331	Tibesti-Jebel Uweinat Montane Xeric Woodlands
PA1304	Atlantic Coastal Desert	PA1332	West Saharan Montane Xeric Woodlands
PA1321	North Saharan Steppe and Woodlands		

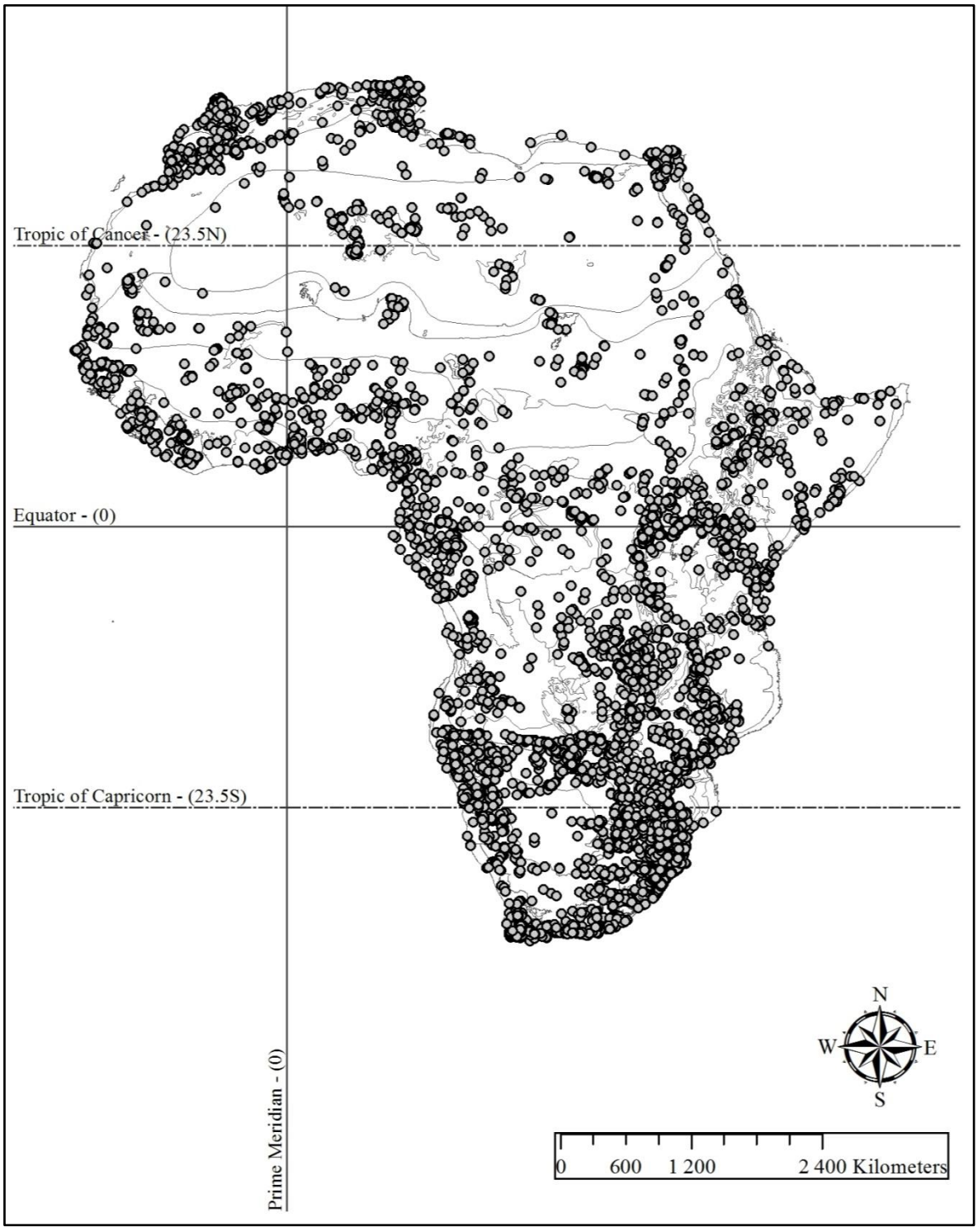
APPENDIX A5: The African Dragonfly Biotic Index (ADBI) scores (0 to 9) across the African continent.

Maps portraying the spread of the African Dragonfly Biotic Index (ADBI) scores 0 to 9, for the 604 dragonfly species across the African continent according to the terrestrial ecoregions as established by The Nature Conservancy (2013). Within each map, each dot represents a distribution record of a dragonfly species with a particular ADBI score (i.e. a total of 115 269 records). The maps are as follows: (a) ADBI score 0; (b) ADBI score 1; (c) ADBI score 2; (d) ADBI score 3; (e) ADBI score 4; (f) ADBI score 5; (g) ADBI score 6; (h) ADBI score 7; (i) ADBI score 8 and (j) ADBI score 9.

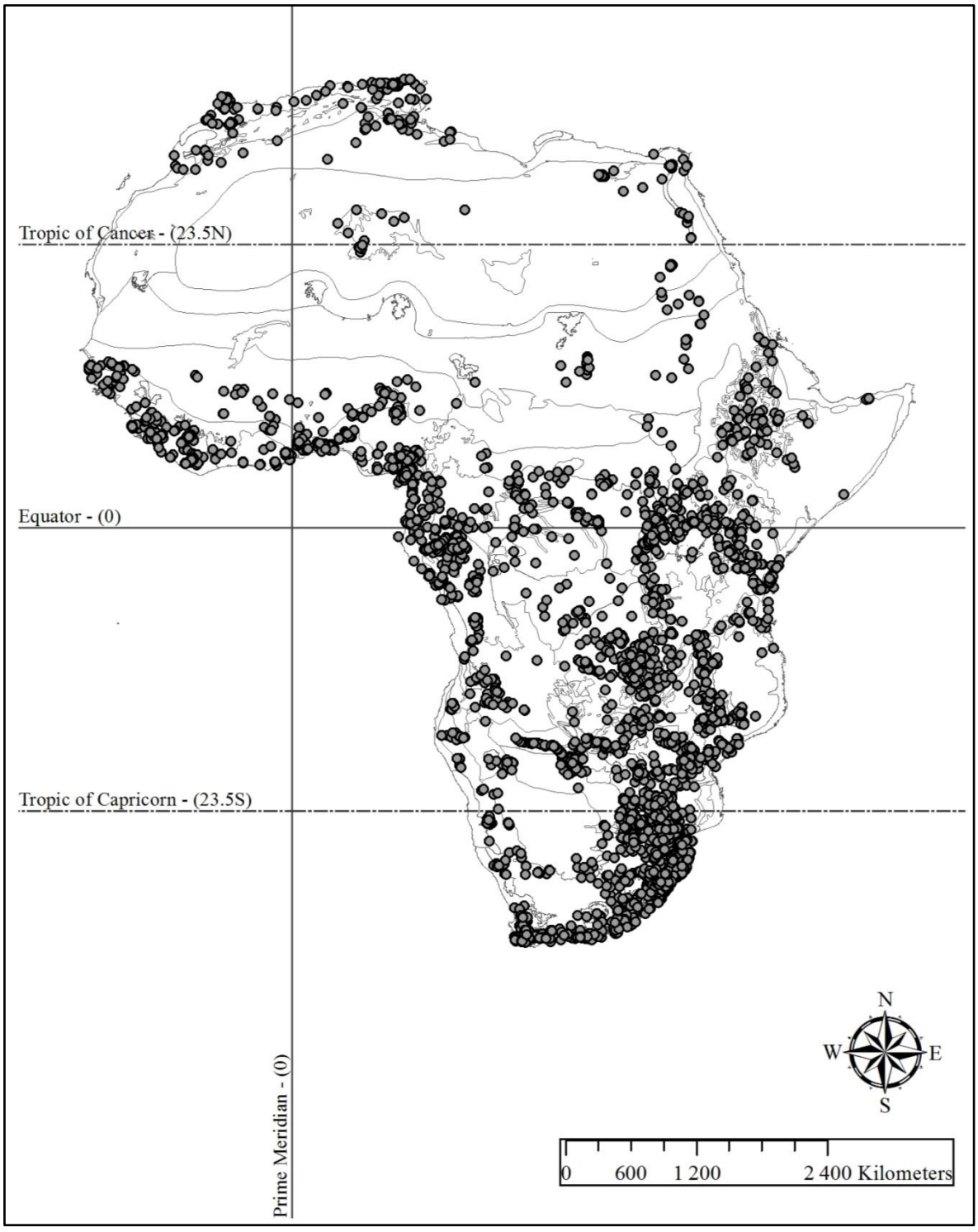
(a) ADBI score 0 (39 species, 25 193 recorded individuals, populate 99/105 terrestrial ecoregions)



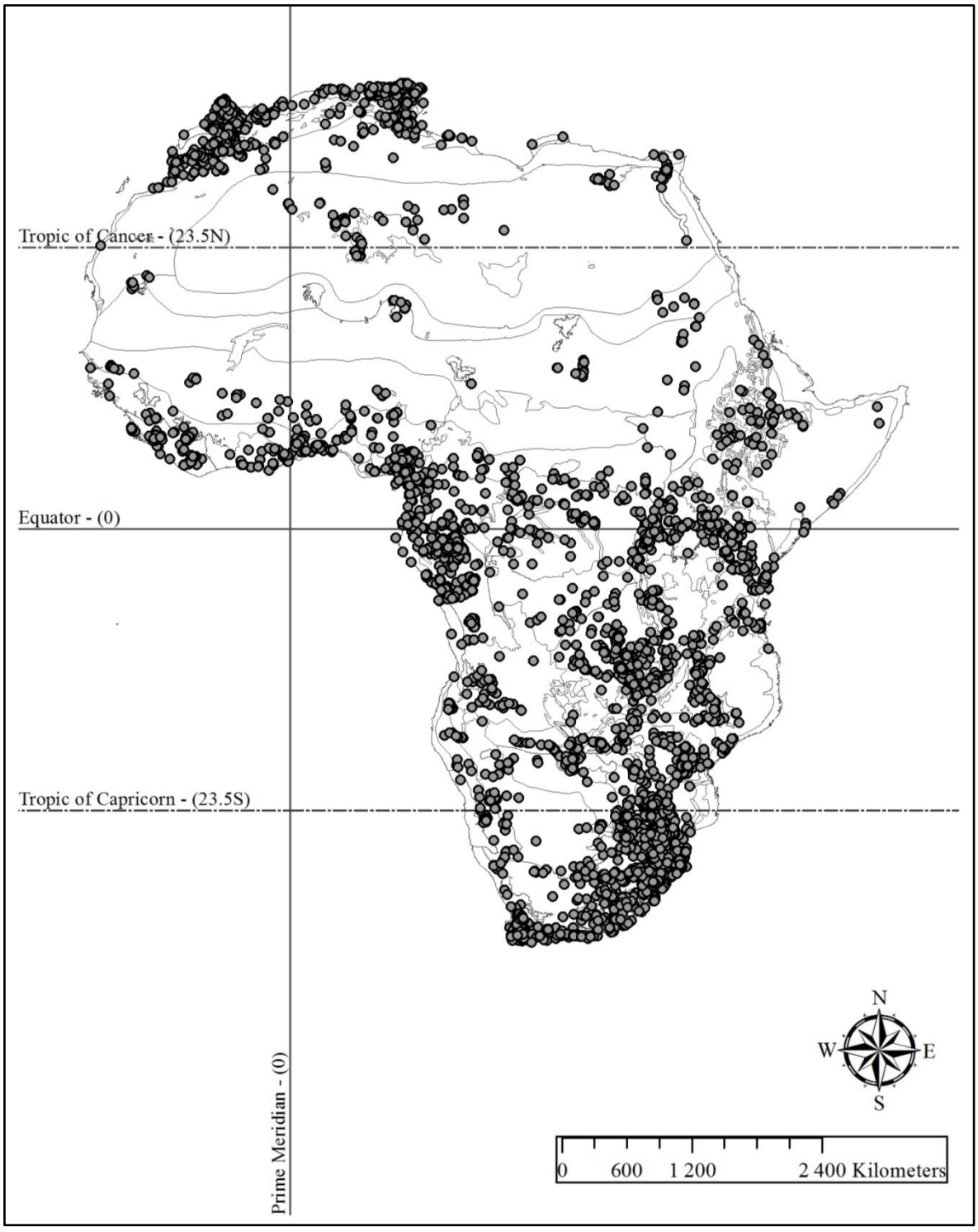
b) ADBI score 1 (60 species, 38 852 recorded individuals, populate 101/105 terrestrial ecoregions)



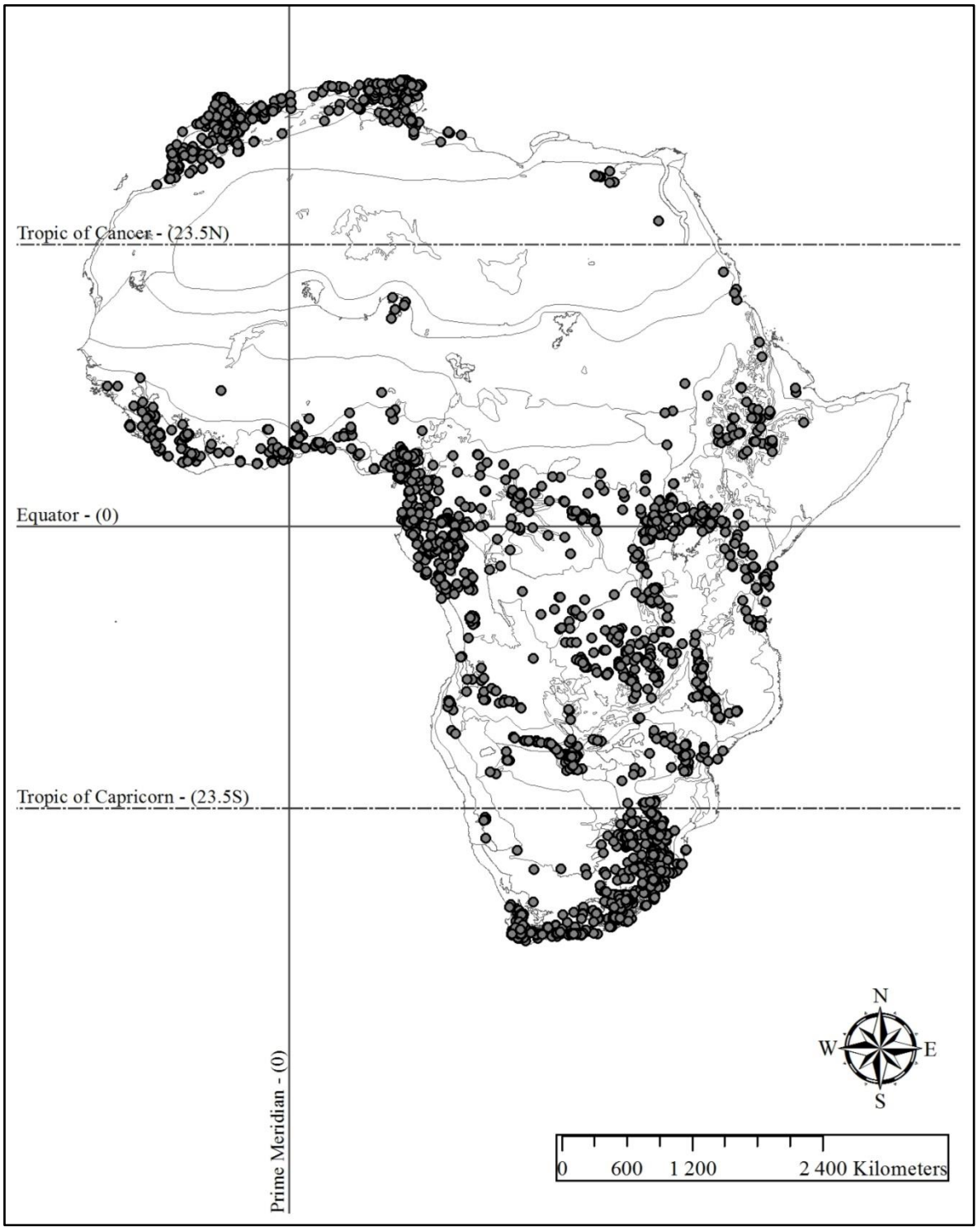
(c) ADBI score 2 (97 species, 18 381 recorded individuals, populate 90/105 terrestrial ecoregions)



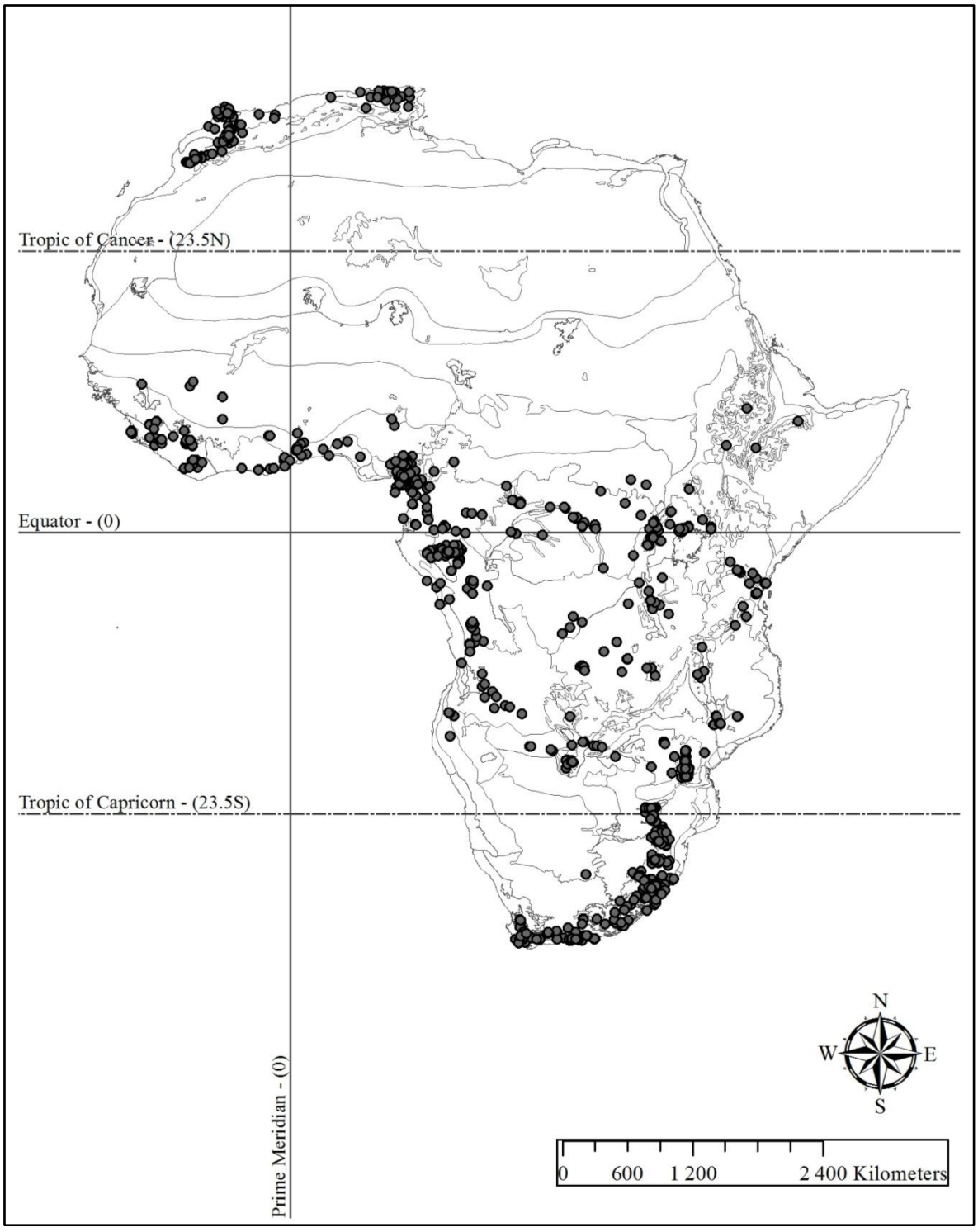
(d) ADBI score 3 (156 species, 15 876 recorded individuals, populate 91/105 terrestrial ecoregions)



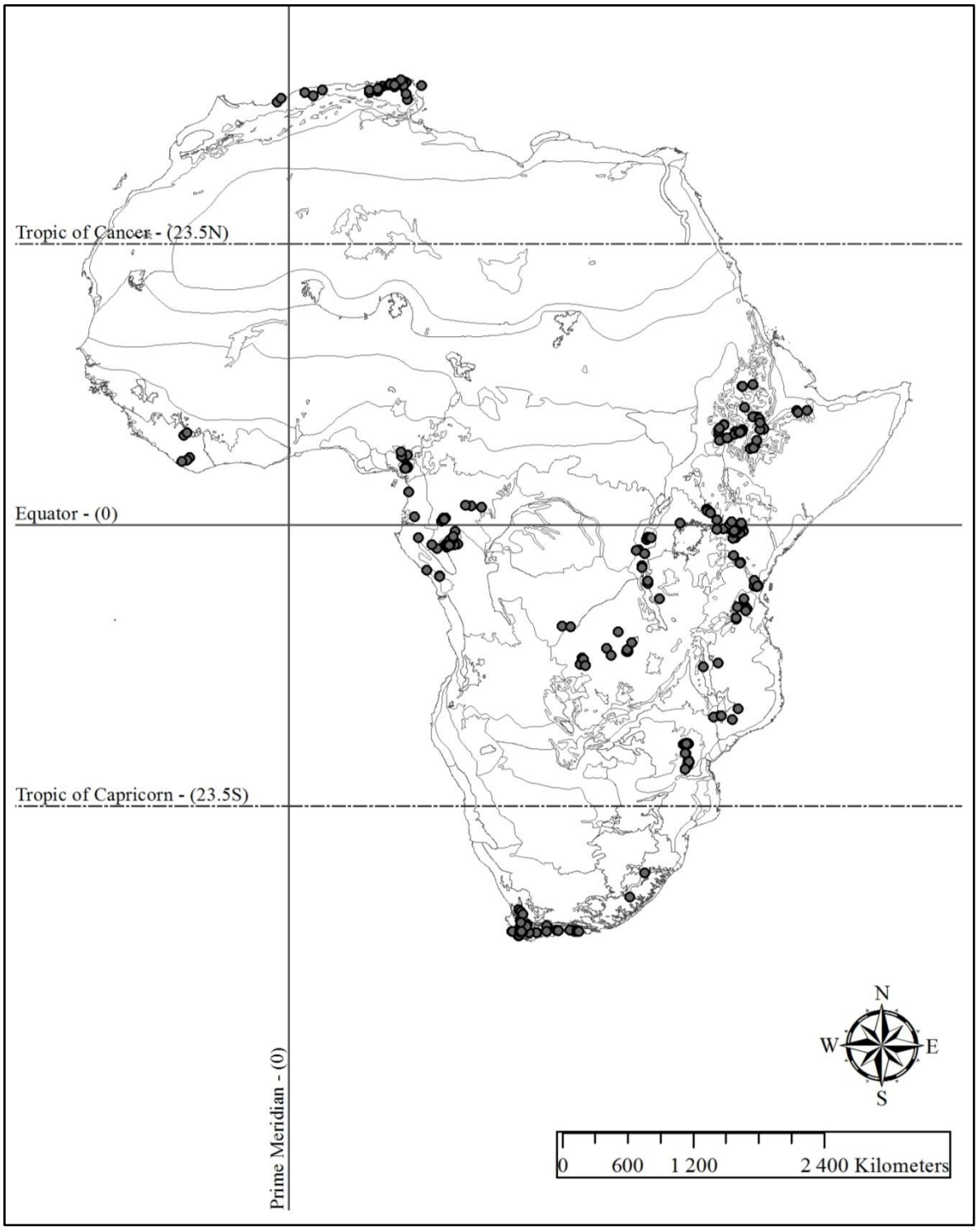
(e) ADBI score 4 (146 species, 12 964 recorded individuals, populate 84/105 terrestrial ecoregions)



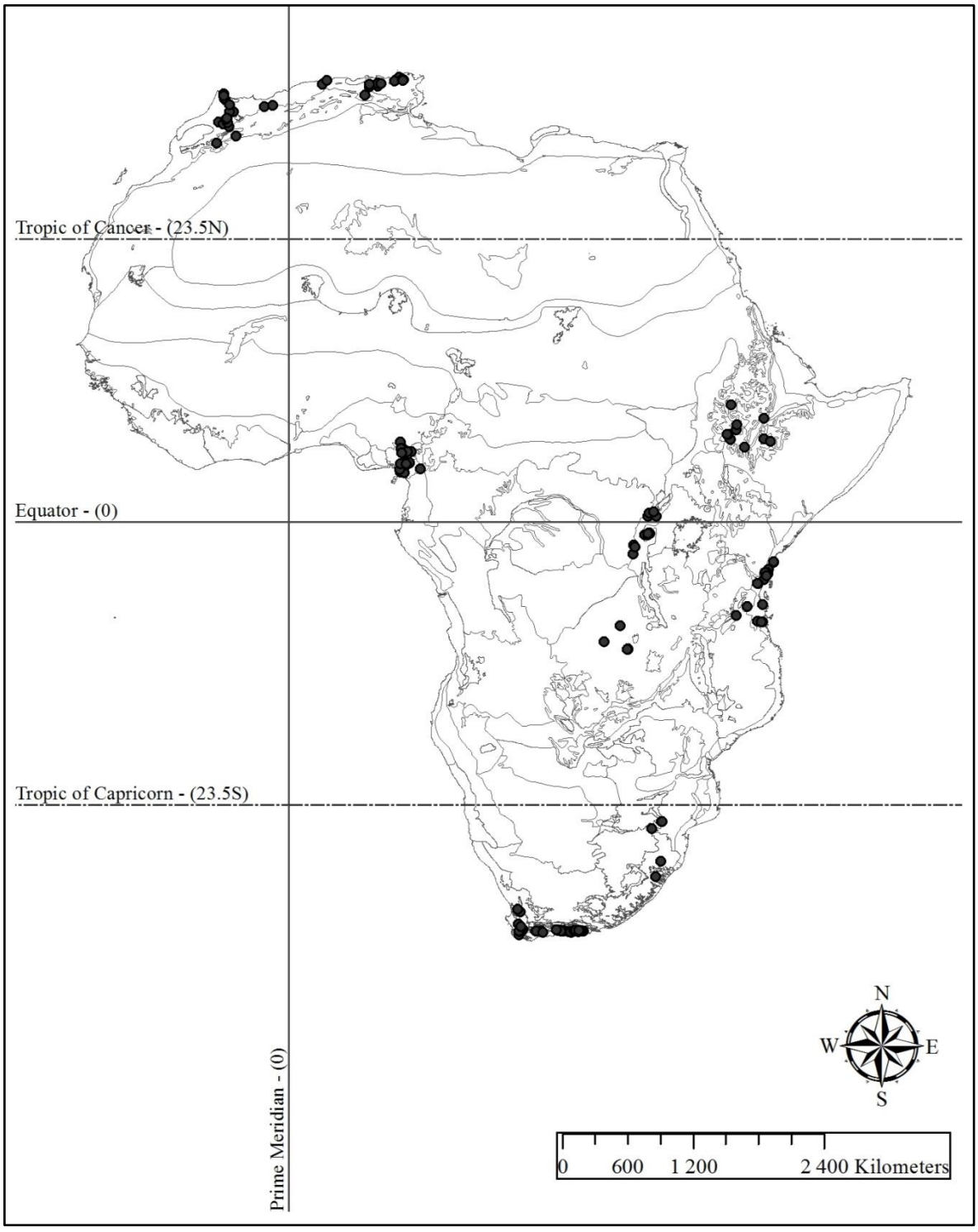
(f) ADBI score 5 (50 species, 2 484 recorded individuals, populate 62/105 terrestrial ecoregions)



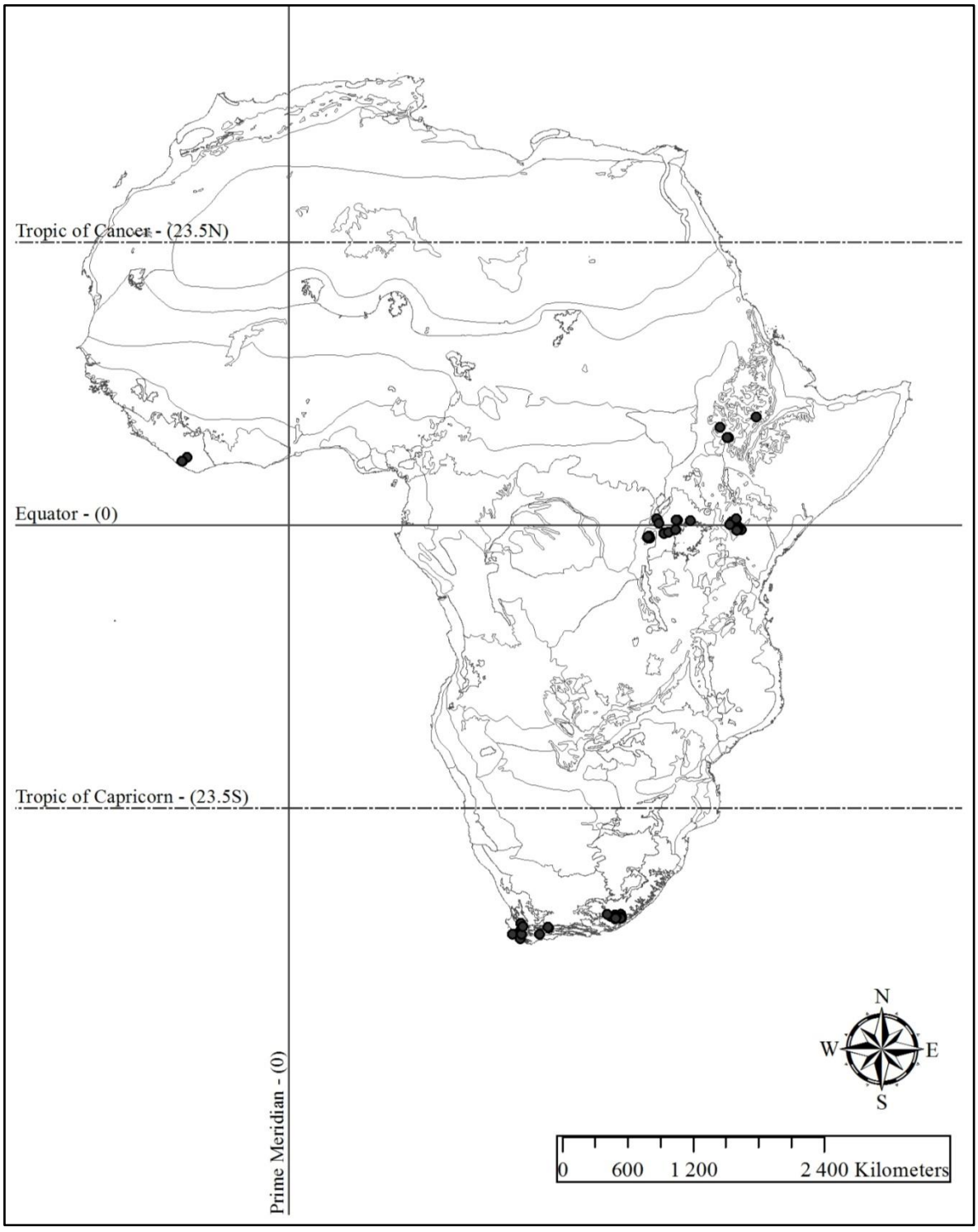
(g) ADBI score 6 (27 species, 750 recorded individuals, populate 32/105 terrestrial ecoregions)



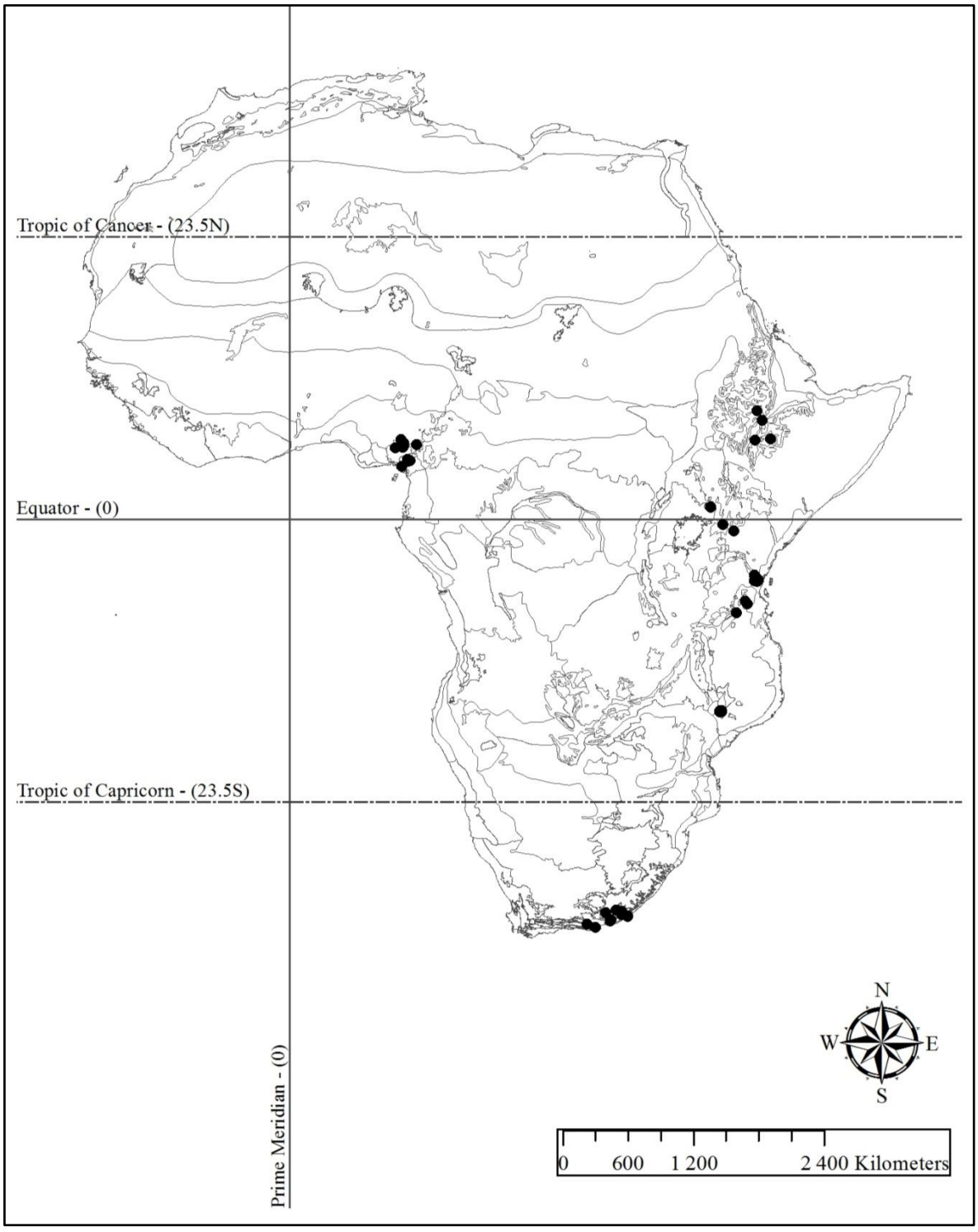
(h) ADBI score 7 (11 species, 477 recorded individuals, populate 22/105 terrestrial ecoregions)



(i) ADBI score 8 (9 species, 163 recorded individuals, populate 11/105 terrestrial ecoregions)



(j) ADBI score 9 (9 species, 129 recorded individuals, populate 18/105 terrestrial ecoregions)



CHAPTER 3

Comparison of national and continental dragonfly biotic indices

ABSTRACT

Freshwaters are the most threatened ecosystems in the world. In order to measure their condition, reliable assessment methods are needed. The South African Dragonfly Biotic Index (DBI) is a biomonitoring tool used to assess changes in the country's still and running freshwaters resulting from human impacts. The DBI scores of each dragonfly species are derived from the total of three sub-indices: 1) geographical distribution (using provinces), 2) global and national IUCN/SSC Red List threat status, and 3) habitat sensitivity to anthropogenic disturbances. In view of concerns for Africa's freshwaters in general, the DBI was scaled up, so as to assess possible anthropogenic impacts across the whole continent, using a modified DBI, the African Dragonfly Biotic Index (ADBI). The ADBI also consists of three sub-indices, with the scores of each dragonfly species derived from the total of three sub-indices: 1) geographical distribution (using latitude and longitude), 2) global Red List threat status, and 3) species vulnerability to anthropogenic disturbances. These three sub-indices were assessed at the continental scale, necessitating some changes in the calculations of the ADBI scores. To determine whether or not the sub-indices and final scores of the ADBI deviate from those of the DBI, a correlation was made between the sub-indices and final scores of the ADBI and the DBI using the subset made up of all South African dragonfly species. It was found that the Red List threat status sub-index scores, as well as the final scores of the ADBI and DBI, are strongly correlated. However, the geographical distribution and habitat sensitivity/species vulnerability sub-index scores of the ADBI and DBI were only moderately correlated. Furthermore, the sub-index that contributed the most to the deviation of the ADBI from the DBI was the ADBI species vulnerability sub-index. While the ADBI is appropriate for a full continental scale assessment, it has shortcomings for national level assessments, the level of much conservation policy and management. Conversion to a national DBI from the ADBI can be done by recalibrating the three sub-indices: locally appropriate geographical divisions, introducing national Red List threat statuses, and converting the subjective vulnerability sub-index into an objective habitat sensitivity sub-index.

Abbreviations used: ADBI – African Dragonfly Biotic Index; ADHM – African Dragonfly Habitat Matrix; DBI – Dragonfly Biotic Index (South Africa); IUCN/SSC – International Union for the Conservation of Nature/Species Survival Commission; ODA – Odonata Database of Africa.

1. INTRODUCTION

Freshwater ecosystems are crucial for sustaining both the environment and local people (i.e. Revenga *et al.* 2005; Dudgeon *et al.* 2006). The services provided by these ecosystems can include material values (e.g. food, clean water and goods), recreational values (e.g. river rafting), and resistance to anthropogenic impacts (Revenga *et al.* 2005). However, freshwater ecosystems are the most threatened ecosystem types in the world (Revenga *et al.* 2005; Dudgeon *et al.* 2006; Vörösmarty *et al.* 2010; Carpenter *et al.* 2011). The more serious threats, such as water pollution, overexploitation of water resources, invasion by alien species, habitat degradation, and flow modification, can jeopardise the effectiveness of these freshwater ecosystems for service delivery (Revenga *et al.* 2005; Dudgeon *et al.* 2006; Vörösmarty *et al.* 2010; Carpenter *et al.* 2011).

Southern Africa's scarce freshwater ecosystems are particularly threatened by pollution, the presence of alien tree species, and by the high volume of water abstraction (Darwall *et al.* 2009). For these reasons, it is important to monitor these ecosystems to determine whether they are stable or deteriorating. In view of this, a biomonitoring tool was created to observe possible changes in South Africa's freshwater ecosystems, i.e. the South African Dragonfly Biotic Index (DBI). An earlier index was initially created by Samways and Taylor (2004), with the DBI further developed by Simaika and Samways (2009, 2011, 2012) to rapidly assess the changing conditions of South Africa's freshwater ecosystems. The DBI is primarily based on the presence of adult dragonfly species (Odonata), including true dragonflies (Anisoptera) and damselflies (Zygoptera), associated with the various freshwater ecosystems, both running and still. Dragonflies were chosen here as they are an ideal taxonomic group for bioindication (e.g. Clark & Samways 1996; Smith *et al.* 2007; Oertli 2008; De Olieveira-Junior *et al.* 2015). They are also globally recognized to be good indicators of water condition, such as the health and integrity of various freshwater ecosystems (e.g. Samways 2005; Smith *et al.* 2007; Silva *et al.* 2010; Simaika & Samways 2011; Kutcher & Bried 2014; Chovanec *et al.* 2015; Dutra & De Marco 2015; Golfieri *et al.* 2016; Martín & Maynou 2016).

Each species in South Africa has a particular DBI value, which is derived from the total of three sub-indices: 1) its species' geographical distribution (according to provinces), 2) its International Union for the Conservation of Nature/Species Survival Commission (IUCN/SSC) Red List threat status (national and global), and 3) its sensitivity to anthropogenic disturbances to its habitat. Scores of each of these DBI sub-indices range from 0 to 3, with the final DBI value of each species being the sum of these scores for the three sub-indices, ranging from 0 to 9 (Samways & Simaika 2016). A dragonfly species that has a widespread distribution, is non-threatened, and is highly tolerant of anthropogenic disturbances, scores 0 (0 + 0 + 0), whereas a species that has a highly restricted distribution, is highly threatened, and is extremely sensitive to habitat disturbances, scores 9 (3 + 3 +

3). A description of these three sub-indices as they are classified and scored is given in Table 3.1, taken from Samways and Simaika (2016).

Using the DBI as a template, as well as the data collated by Kipping *et al.* (2009), a new biomonitoring tool was developed for the entire African continent, i.e. the African Dragonfly Biotic Index (ADBI) (see Chapter 2). The goal of the ADBI is to assist with conservation planning and actions that may preserve or restore the different freshwater ecosystems within Africa. However, owing to the continental scale that the ADBI covers, there are several differences in how the ADBI sub-indices are calculated. Therefore, the main aim here is to compare the ADBI with the original South African DBI to determine how this continental biotic index relates to the DBI according to the dragonfly species recorded within South Africa. The null hypothesis, is that the ADBI have a one-to-one relationship with the South African DBI. If this is the case, the ADBI scores will be exactly the same as the already assessed DBI scores for the South African species. However, if there is no or only a weak relationship between these two biotic indices, the second aim is to determine which of the three sub-indices (i.e. geographical distribution, threat status or species vulnerability) have the greatest influence on the calculating the ADBI scores and deviating from the DBI scores.

2. MATERIALS AND METHODS

2.1 Background on the African Dragonfly Biotic Index (ADBI)

The African Dragonfly Biotic Index (ADBI) is similar in principle to the South African DBI, i.e. to rapidly assess the changing conditions of freshwater ecosystems in Africa. As with the DBI, the ADBI is based on the presence of adult odonates (Anisoptera and Zygoptera) within the continent's freshwater ecosystems. It, like the DBI, consists of three sub-indices, but each is slightly different to accommodate the differences in spatial scale, i.e. national for the DBI and continental for the ADBI. The three sub-indices of the ADBI are: 1) a species' geographical distribution, 2) its IUCN/SSC Red List threat status, and 3) its vulnerability to negative anthropogenic disturbances to its habitat. Any of the selected African dragonfly species' can have any one sub-index score ranging from 0 to 3, and as each species is assigned three sub-index scores, a species' ADBI can range from 0 to 9, i.e. 0 + 0 + 0 to 3 + 3 + 3.

As the three sub-indices of the ADBI are determined at a continental scale, while the DBI sub-indices are national, the three sub-indices of the ADBI were calculated differently from those of the DBI. This means that: 1) the scoring for the species' IUCN/SSC Red List threat status was determined exclusively at a global scale (i.e. with no national status), 2) the geographical distribution was determined at the continental scale (African continent), and 3) the species vulnerability to

anthropogenic disturbances to their habitats were also assessed at a continental scale, i.e. measuring the adverse anthropogenic impacts to the species preferred habitats and their possible reactions (African continent).

The difference between the ADBI and the DBI sub-index 'geographical distribution', is that this DBI sub-index is based on conservation-action units, i.e. the political boundaries of state provinces. This geographical distribution sub-index is ideal for South Africa as the provinces also happen to be biogeographically meaningful (Samways & Simaika 2016). However, this is not necessarily the case for the rest of the African continent. This meant that an alternative geographical approach had to be adopted for the African continent that was both practical and yet useful for the development of a meaningful ADBI geographical distribution sub-index at the continental level. Subsequently, the ADBI geographical distribution sub-index was calculated using the Odonata Database of Africa (ODA), which is a comprehensive spatial database of individually recorded dragonfly species across the African continent (Kipping *et al.* 2009; Dijkstra *et al.* 2011; Clausnitzer *et al.* 2012; Simaika *et al.* 2013). The geographical coordinates located within this database were used to determine the latitude-longitude range sizes of the respective species across the African continent. The range sizes were divided into four categories that are represented by the sub-scores 0 to 3 (see Chapter 2).

In the case of the DBI sub-index 'Red List threat status', both the national and global statuses were used, whereas for the whole continent, there are no national Red List threat statuses, only global ones. For each species, the ADBI (global) Red List threat status sub-index was the same as that on IUCN/SSC Red List threat status, as established by the IUCN Red List Categories and Criteria, version 3.1, second edition (IUCN 2016). These threat statuses were also divided into four categories that are represented by the sub-scores 0 to 3 (see Chapter 2). The Red List threat status for each African dragonfly species were obtained from the website www.iucnredlist.org.

The DBI sub-index 'habitat sensitivity' was based on the level of occurrence of dragonflies in fully natural versus human-modified or created habitats. This could be done for South Africa, as the species in the country are relatively well known, which is not so when the odonate assemblage is scaled up to a continental level. In contrast, the ADBI species vulnerability sub-index was determined using a habitat matrix, the African Dragonfly Habitat Matrix (ADHM), which was created by 15 dragonfly specialists who described the preference of each dragonfly species for a particular habitat. This sub-index was calculated by first determining how sensitive the habitats may be to the impacts specific anthropogenic disturbances may have on them (i.e. habitat conversion, water management and the presence of alien trees) and second, how vulnerable each species may be to these impacts within their particular habitats. This species vulnerability sub-index was also divided into four

categories that are represented by the sub-scores 0 to 3 (see Chapter 2). Descriptions of these three ADBI sub-indices with their respective sub-scores are given in Table 3.1.

2.2 Data

The data covers the 162 South African dragonfly species in Samways and Simaika (2016). In turn, the data here includes the three sub-index scores and final scores of both the DBI and the ADBI. The three sub-index and final scores of the South African DBI were taken from Samways and Simaika (2016), while the three sub-index and final ADBI scores are from Chapter 2. Although the data are sourced from a similar dataset, two different groups of biotic values are compared with each other so as to identify whether the ADBI measures up to the original DBI. All 162 species, with their corresponding three sub-index scores and final scores of both the DBI and ADBI, are listed in Appendix B1.

2.3 Data analyses

To determine the extent of correlation between the ADBI and the DBI, the data (categorical) were examined as follows. Firstly, a non-parametric Kolmogorov-Smirnov (K-S) one-sample test for normality was used to determine whether or not the data, as described above, had a normal distribution. Secondly, a non-parametric Spearman Rank Correlation ($-0.7 \leq r \leq 0.7$) was used to determine whether any significant relationships existed between the three sub-indices, as well as between the final scores of the DBI and ADBI. Next, to assess how the scoring of 162 South African dragonfly species might have changed, the species' three sub-index scores and final scores of the DBI were visually compared with the respective species' three sub-index scores and final scores of the ADBI. Finally, the veracity of the third sub-index of the ADBI (species vulnerability) was re-examined by recalculating the final ADBI scores of all the South African species. This was accomplished by using the DBI third sub-index (habitat sensitivity) scores instead of those of the ADBI third sub-index (species vulnerability). Thus, the original DBI scores were compared with the new ADBI scores of the 162 species, which includes ADBI sub-indices 1 (geographical distribution) and two (threat status) plus the DBI sub-index 3 (habitat sensitivity). All data were interrogated using STATISTICA 13 (Dell Inc. 2016).

Table 3.1. Description of the three sub-indices of both the South African Dragonfly Biotic Index (DBI) and the African Dragonfly Biotic Index (ADBI). The three sub-indices are: geographical distribution (DBI and ADBI sub-index 1), threat status (DBI and ADBI sub-index 2), habitat sensitivity (DBI sub-index 3) and species vulnerability (ADBI sub-index 3). The IUCN/SSC threat status abbreviations (IUCN 2016) are: DD – Data Deficient, LC – Least Concern, NT – Near Threatened, VU – Vulnerable, EN – Endangered, CR – Critically Endangered, GS – Global Status, NS – National Status. For the South African DBI, the highest threat status (NS and/or GS) was used. Other abbreviations: lat-long – latitude-longitude.

Scores	South African Dragonfly Biotic Index			African Dragonfly Biotic Index		
	Distribution	**Threat**	**Sensitivity**	**Geographical Distribution**	**Threat Status**	**Species Vulnerability**
0	Very common throughout South Africa and in southern Africa.	LC (GS *and* NS)	Not sensitive; almost impervious to habitat disturbance and may even benefit from habitat change due to alien plants; may thrive in artificial water bodies.	A very wide distribution range size (species have a lat-long range size of more than 50° of continental Africa)	LC	Low vulnerability to certain anthropogenic disturbances (all 3 habitat types* are disturbed)
1	Localised across a wide area in South Africa, and localised or common in southern Africa; or very common in 1-3 South African provinces, and localised or common in southern Africa.	NT (GS and/or NS) *or* VU (NS)	Low sensitivity to habitat change from alien plants; may occur commonly in artificial water bodies.	A wide distribution range size (species have a lat-long range size between 25° and 50° of continental Africa)	NT, DD	Shows some vulnerability to certain anthropogenic disturbances (2 habitat types* are disturbed)
2	National endemic confined to three or more South African provinces; or widespread in southern Africa, but marginal and very rare in South Africa.	VU (GS), *or* EN or CR (NS)	Medium sensitivity to habitat disturbance (e.g. alien plants and bank disturbance); may have been recorded from artificial water bodies.	A narrow distribution range size (species have a lat-long range size between 5° and 25° of continental Africa)	VU	Is vulnerable to certain anthropogenic disturbances (1 habitat type* is disturbed)
3	Endemic or near-endemic and confined to only one or two South African provinces.	EN or CR (GS) (= EN or CR (NS))	Extremely sensitive to habitat change from alien plants; only occurs in undisturbed natural habitat.	A very narrow distribution range size (species have a lat-long range size of less than 5° of continental Africa)	EN, CR	Extremely vulnerable to certain anthropogenic disturbances (no habitat type* is disturbed)

*The habitat types include the occurrence of landscape, water bodies and microhabitats.

3. RESULTS AND DISCUSSION

3.1 Data distribution

Comparing the number of species per sub-index score (0 to 3) of the DBI with those of the ADBI, showed that there were clear increases in the number of species for the ADBI sub-score 0 across the three sub-indices (Table 3.2). There was also a clear decrease in the number of species for the ADBI sub-scores 2 and 3 across the three sub-indices, i.e. the DBI had a higher number of species recorded for these sub-scores (i.e. 2 and 3) for all three sub-indices (Table 3.2). An exception was that of sub-score 3 of the sub-index 'threat status', which had the same number of species recorded for both the DBI and ADBI (Table 3.2). In addition, for sub-score 1, there was an increase in the species numbers for the ADBI sub-indices 'geographical distribution' and 'species vulnerability', but not for the sub-index 'threat status' which had a higher number of species recorded for this DBI sub-index (Table 3.2). Thus, for the most part, the lower sub-index scores had a clear increase in species numbers across the sub-indices for the ADBI, while the higher sub-index scores had a higher recorded number of species for the sub-indices of the DBI. Therefore, it can be deduced that for some of the species that were high scoring according to the DBI (i.e. restricted distribution range, threatened, and sensitive to habitat disturbances), were classified as low scoring according to the ADBI (i.e. wide distribution range, non-threatened, and low vulnerability to anthropogenic disturbances).

Also, according to the maximum distance values (D statistics) of the Kolmogorov-Smirnov (K-S) one-sample test for normality, the three sub-indices of both the DBI and ADBI had significantly different data distributions at $p<.01$ (Table 3.3). The sub-indices included: geographical distribution (DBI and ADBI sub-index 1), threat status (DBI and ADBI sub-index 2), habitat sensitivity (DBI sub-index 3), and species vulnerability (ADBI sub-index 3). Likewise, the maximum distance values of both the DBI and ADBI final scores had significantly different data distributions at $p<.01$ (Table 3.3). Therefore, the overall data distribution of both the DBI and ADBI can be described as having non-normal data distribution. Thus, for both these biotic indices, the spread of the number of species across their sub-index scores and final scores were similar in terms of having non-normal data distribution. However, this does not indicate whether there are any correlations between the scoring of the DBI and ADBI for the South African species.

Table 3.2. Number of South African dragonfly species (N = 162) that were given the respective sub-scores (0 to 3) according to the three sub-indices for the South African Dragonfly Biotic Index (DBI) and African Dragonfly Biotic Index (ADBI). The sub-indices are: DBI and ADBI sub-index 1 – geographical distribution; DBI and ADBI sub-index 2 – threat status; DBI sub-index 3 – habitat sensitivity; and ADBI sub-index 3 – species vulnerability.

Scores	Sub-index 1		Sub-index 2		Sub-index 3	
	DBI	ADBI	DBI	ADBI	DBI	ADBI
0	24	66	120	147	17	26
1	44	48	28	5	44	91
2	69	36	9	5	65	41
3	25	12	5	5	36	4

Table 3.3. D statistics of the Kolmogorov-Smirnov (K-S) one-sample test for normality, for both the South Africa Dragonfly Biotic Index (DBI) and the African Dragonfly Biotic Index (ADBI), are all significant at $p<.01$. The significance is indicated by an asterisk (*). The variables include: the three sub-indices (i.e. DBI and ADBI sub-index 1 – geographical distribution; DBI and ADBI sub-index 2 – threat status; DBI sub-index 3 – habitat sensitivity; and ADBI sub-index 3 – species vulnerability), and the final scores of the DBI and ADBI of the South African dragonfly species (N = 162).

	Variables	max D
South Africa	DBI sub-index 1	0.253*
	DBI sub-index 2	0.438*
	DBI sub-index 3	0.234*
	DBI score	0.122*
Africa	ADBI sub-index 1	0.248*
	ADBI sub-index 2	0.523*
	ADBI sub-index 3	0.302*
	ADBI score	0.171*

3.2 Non-parametric Spearman Rank Correlation

Using the non-parametric Spearman Rank correlation ($-0.7 \leq r \leq 0.7$), the following comparisons were made: DBI vs ADBI sub-index 1 (geographical distribution), DBI vs ADBI sub-index 2 (threat status), DBI vs ADBI sub-index 3 (habitat sensitivity/species vulnerability), and DBI vs ADBI final scores. Comparisons were also made among the sub-indices and final scores, e.g. DBI sub-index 1 (geographical distribution) vs ADBI sub-index 2 (threat status); or ADBI sub-index 3 (species vulnerability) vs DBI final scores. According to Spearman, all three sub-indices and final scores of both the DBI and ADBI were significant at $p<.05$ (Table 3.4). The significance was indicated by an asterisks (*). Furthermore, these correlations could be divided into three groups, i.e. 1) strong correlations (r-values >0.6; ***), moderate correlations (r-values 0.4 – 0.6; **), and 3) weak correlations (r-values <0.4; *).

There were strong correlations between the DBI and ADBI sub-index 2 (threat status; $r = 0.606$) and the DBI and ADBI final scores ($r = 0.624$) (Table 3.4). There was a moderately strong correlation for DBI and ADBI sub-index 1 (geographical distribution; $r = 0.568$) and the DBI and ADBI sub-index 3 (habitat sensitivity/species vulnerability; $r = 0.465$) (Table 3.4). Regarding the other correlations of DBI with ADBI sub-indices, these sub-indices were moderately correlated with each other, except for DBI sub-index 2 (threat status) and ADBI sub-index 3 (species vulnerability), which had a weak correlation ($r = 0.338$) with each other (Table 3.4). Also, the final scores of DBI vs ADBI had a moderate to strong correlation with the three sub-indices of these two biotic indices (Table 3.4). These results suggest a corresponding association between sub-indices and final scores of the DBI and ADBI. This indicates that, like the DBI, it is likely that the ADBI can act as a conservation tool for a specific country within Africa.

Table 3.4. Spearman Rank correlations ($-0.7 \leq r \leq 0.7$) were significant at $p<.05$ for all three sub-indices and final scores of both the South African Dragonfly Biotic Index (DBI) and African Dragonfly Biotic Index (ADBI). Significance is indicated by an asterisk (*). The sub-indices are: DBI and ADBI sub-index 1 – geographical distribution; DBI and ADBI sub-index 2 – threat status; DBI sub-index 3 – habitat sensitivity; and ADBI sub-index 3 – species vulnerability. All 162 South African species were assessed.

DBI	Sub-index 1	Sub-index 2	Sub-index 3	Final Score
ADBI				
Sub-index 1	**0.568****	0.442**	0.582**	0.622***
Sub-index 2	0.444**	**0.606*****	0.405**	0.492**
Sub-index 3	0.428**	0.338*	**0.465****	0.486**
Final Score	0.557**	0.453**	0.586**	**0.624*****

*DBI sub-index 2 (threat status) had a weak correlation with ADBI sub-index 3 (species vulnerability); r-values <0.4.

**The sub-indices and final scores had a moderate correlation with each other (r-values 0.4 – 0.6).

***The sub-indices and final scores had a strong correlation with each other (r-values >0.6).

3.3. Comparing the South African Dragonfly Biotic Index (DBI) with the African Dragonfly Biotic Index (ADBI): the three sub-indices

Within this section, the three sub-index scores (0 to 3) of the DBI were compared with the respective three sub-index scores (0 to 3) of the ADBI. The comparisons were as follows: sub-index 1 – DBI vs ADBI (geographical distribution), sub-index 2 – DBI vs ADBI (threat status), and sub-index 3 – DBI vs ADBI (habitat sensitivity vs species vulnerability). The differences that were viewed between the sub-scores of these sub-indices, are presented as various species lists and are divided into five main groups (listed in Appendix B2). These groups are: group 1 – geographical distribution (lower ADBI scores); group 2 – geographical distribution (higher ADBI scores); group 3 – threat status (lower ADBI scores); group 4 – habitat sensitivity/species vulnerability (lower ADBI scores); and group 5 – habitat sensitivity/species vulnerability (higher ADBI scores). Each of these groups is further sub-divided according to the difference between the DBI and ADBI sub-index scores 0 to 3.

3.3.1 Sub-index 1: geographical distribution

Comparing the geographical distribution sub-index scores (0 to 3) of the DBI with the ADBI, revealed that the South African dragonfly species could be divided into three main clusters for this sub-index. That is: 1) the species that had a perfect relationship between the DBI and ADBI sub-scores (the dotted line), 2) the species that had a lower ADBI sub-score (below the dotted line – group 1, Appendix B2), and 3) the species that had a higher ADBI sub-score (above the dotted line – group 2, Appendix B2) (Fig. 3.1). Of the 162 South African species, 36% had a perfect correlation between the sub-scores of the DBI and ADBI geographical distribution sub-index, while 56% had lower ADBI sub-scores for this sub-index (Fig. 3.1). Conversely, only 8% of the South African species had higher ADBI than DBI sub-scores for this sub-index (Fig. 3.1).

The group of species that had lower ADBI than DBI distribution sub-scores (group 1, Appendix B2) could be further divided into three main groups, which are shown by the coloured circles blue, orange and green (Fig. 3.1). The species within the blue circle are listed as three sub-groups within Appendix B2, i.e. sub-group A (DBI 1: ADBI 0; 30 species), sub-group B (DBI 2: ADBI 0; 22 species) and sub-group C (DBI 2: ADBI 1; 25 species). The species within the blue group can be generally classified as tropical species with distributions that spill over the South African border, as well as having some discontinuous spread within the country (i.e. sub-scores 1 and 2 of the DBI distribution description in Table 3.1). On the other hand, these species are considered to be more common in central Africa and therefore, it could be considered that their centre of distribution (from which they radiate) is the tropics. Some of these species also have more spotty distributions within South Africa (e.g. *Crocothemis sanguinolenta*, sub-group A and *Agriocnemis gratiosa*, sub-group C), while a few others occur only at moderate to high elevations, e.g. *Orthetrum abbotti* and *Pseudagrion*

sublacteum (sub-group A, group 1, Appendix B2). Thus, the species within this blue group can be described as having a more limited spread within South Africa (sub-scores 1 and 2 of the DBI), while being more widespread on the Africa continent, giving those species lower sub-scores in terms of the ADBI geographical distribution sub-index (sub-scores 0 and 1).

The 11 species within the orange circle (DBI 3: ADBI 2; Fig. 3.1 and sub-group D, group 1, Appendix B2) are distinct South African endemics, with *Ceratogomphus triceraticus* being a Cape endemic. The species *Urothemis luciana* is considered a near South African endemic, but it is also classified as a tropical species (Fig. 3.1 and sub-group D, group 1, Appendix B2). According to the DBI distribution scores, these species have a very limited spread among the provinces of the country and therefore, received higher sub-index scores (Samways and Simaika 2016). However, regarding the latitude-longitude range size in which these species occur within the African continent, their distributions can only be described as narrow, i.e. lower ADBI sub-index scores (Table 3.1). The two species within the green circle (Fig. 3.1 and group 1, Appendix B2), *Chlorocypha consueta* (DBI 3: ADBI 1; sub-group E) and *Ceriagrion suave* (DBI 3: ADBI 0; sub-group F), occur just over the border of South Africa and are rare in the country (Samways and Simaika 2016). On the other hand, these two species are classified as having a fairly wide latitude-longitude range size across the Africa continent (Table 3.1).

The group of species that had higher ADBI than DBI geographical distribution sub-index scores are circled in red (Fig. 3.1), and are divided into three sub-groups according to the differences in the sub-scores (sub-groups A to C, group 2, Appendix B2). The species within this group are common and/or localised throughout South Africa and southern Africa (Table 3.1), with *Agriocnemis pinheyi* and *Syncordulia gracilis* occurring in mountainous regions (sub-group C, group 2, Appendix B2). However, according to the latitude-longitude range sizes for the species within this group, as established for the ADBI geographical distribution sub-index, they have a narrower distribution range across the African continent (Table 3.1). Thus, for this group, South Africa can be considered as a stronghold for these species that may spill over the country's border northwards.

For the most part, the South African species that have a spotty distribution within the country's borders, have a wider distribution range within Africa. On the other hand, only a few that are classified to be common or localised in South Africa, are categorised as having a more limited distribution due to the range sizes of the ADBI distribution description. Consequently, although there is a moderate relationship between the scoring of the distribution sub-index of the DBI and ADBI, the scoring of the ADBI geographical distribution sub-index is influenced by the scale at which it occurs, i.e. the latitude-longitude range sizes of the African continent. Overall, the ADBI distribution classifications differ from those of the DBI, and therefore, this sub-index influences the calculations of the ADBI.

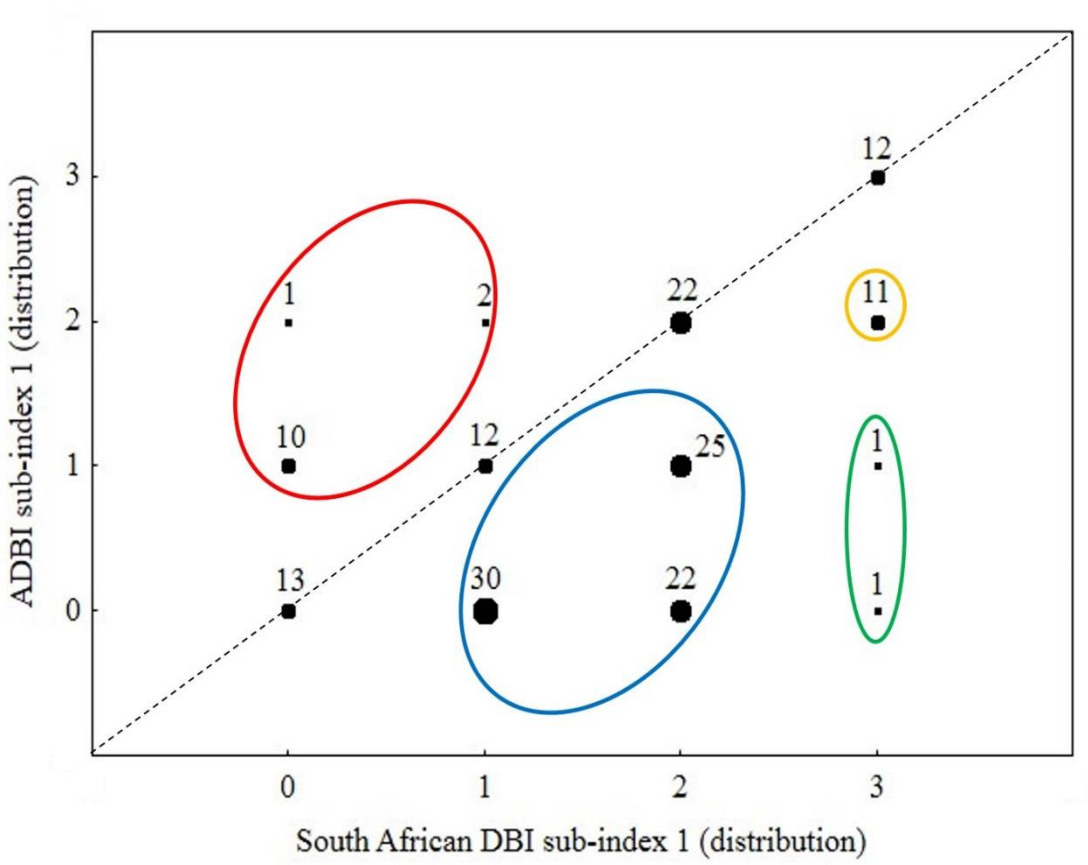


Figure 3.1. Number of species recorded per sub-index score (0 to 3) of the South African Dragonfly Biotic Index (DBI) versus the African Dragonfly Biotic Index (ADBI), for the first sub-index, 'geographical distribution'. The dotted line indicates the spread of the data when there is a perfect correlation between the DBI and ADBI sub-index scores, i.e. one-to-one relationship. The species could be divided into three main clusters for the geographical distribution sub-index: 1) the species that had a perfect correlation between the DBI and ADBI sub-scores 0 to 3 (the dotted line), 2) the species that had a lower ADBI sub-score (below the dotted line), and 3) the species that had a higher ADBI sub-score (above the dotted line). Only 36% of the 162 South African species had a correlation between the geographical distribution sub-index scores of the DBI and ADBI. Most of the species had lower ADBI geographical distribution sub-index scores.

3.3.2 Sub-index 2: threat status

Comparing the threat status sub-index scores (0 to 3) of the DBI with the ADBI, revealed that the South African dragonfly species could be divided into two main clusters for the threat status sub-index: 1) species that had a perfect correlation between the DBI and ADBI sub-scores (the dotted line), and 2) species that had a lower ADBI sub-score (below the dotted line – group 3, Appendix B2) (Fig. 3.2). Thus, of the 162 species, 83% had a perfect correlation between their threat status for the DBI (national and/or global) and ADBI (global) (Fig. 3.2). In contrast, the other 27 species below the dotted line (within the blue circle) are classified with higher national than global threat statuses (Table 3.1 and Fig. 3.2). This group of species (group 3, Appendix B2) could be divided into two sub-groups, i.e. sub-group A (DBI 1: ADBI 0; 23 species) and sub-group B (DBI 2: ADBI 0; 4 species).

The species listed within sub-group A have national threat statuses categorised as either 'Near Threatened' (e.g. *Olpogastra lugubris*) or 'Vulnerable' (e.g. *Gomphidia quarrei*) (Table 3.1 and group 3, Appendix B2). The species listed within sub-group B have national threat statuses of either 'Endangered' (e.g. *Ceriagrion suave*) or 'Critically Endangered' (e.g. *Chlorocypha consueta*) (Table 3.1 and group 3, Appendix B2). Consequently, in South Africa, this entire group of species are considered to be of national conservation concern. Yet, on a global scale, this group of species are overall classified as of 'Least Concern', i.e. received the ADBI sub-index score 0 (Table 3.1 and Fig. 3.2). Also, as seen in Figure 3.2, there is no group of species that have higher ADBI than DBI threat status sub-index scores. This is due to the other African countries currently not having national Red List threat statuses.

Most of the species have the exact same scoring (0 to 3) between the DBI and ADBI threat status sub-index. Moreover, there is a strong correlation between the scoring of these two biotic indices. Consequently, the scoring of the ADBI threat status sub-index was not as heavily influenced by the scale at which it occurs, i.e. the global IUCN/SSC threat status. Overall, the ADBI threat status classifications did not differ greatly from those of the DBI, and therefore, this sub-index did not have such a great influence on the calculations of the final ADBI scores.

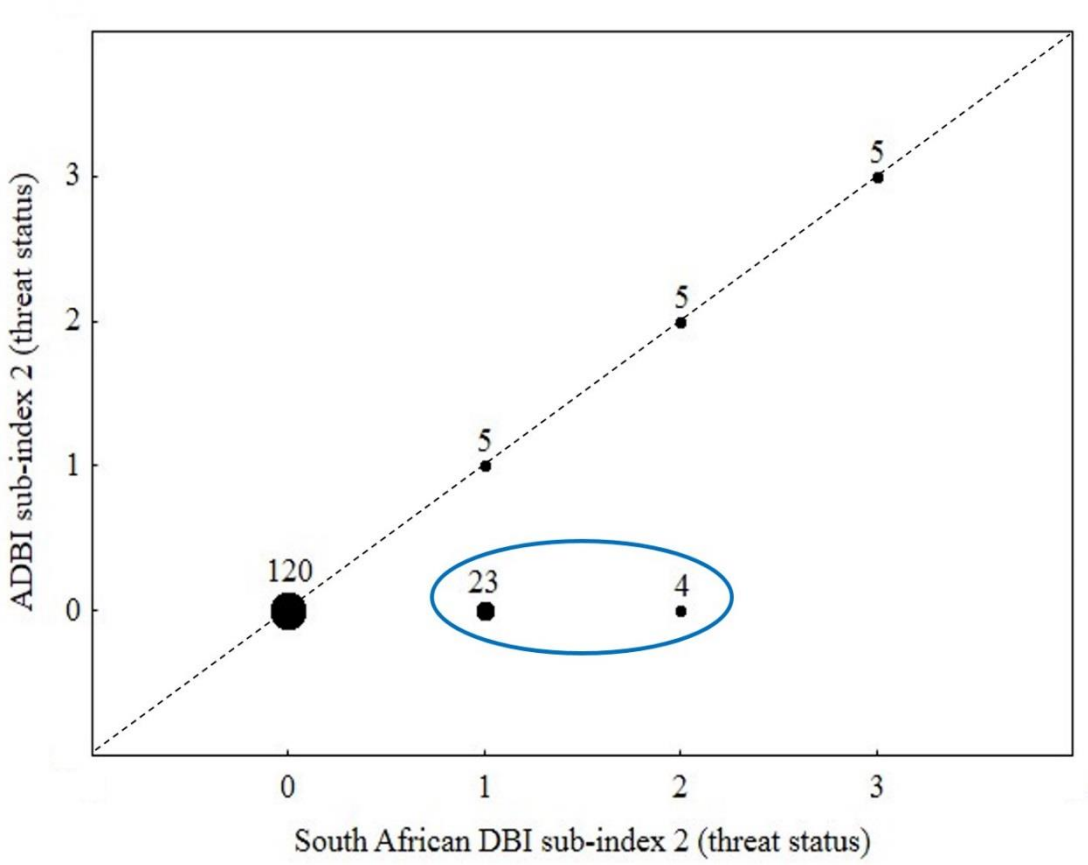


Figure 3.2. Number of species recorded per sub-index score (0 to 3) of the South African Dragonfly Biotic Index (DBI) versus the African Dragonfly Biotic Index (ADBI), for the second sub-index, 'Red List threat status'. The species could be divided into two main clusters for this sub-index, i.e. 1) species that had a perfect correlation between the DBI and ADBI sub-scores 0 to 3 (the dotted line), and 2) species that had a lower ADBI sub-score (below the dotted line). Of all 162 South African species, 83% had a strong correlation between the threat status sub-index scores of the DBI and ADBI.

3.3.3 Sub-index 3: habitat sensitivity/species vulnerability

Similar to the geographical distribution sub-index, comparing the third sub-index scores of the DBI with the ADBI revealed that the South African dragonfly species could be divided into three main clusters for this sub-index: 1) species that had a perfect correlation between the DBI and ADBI sub-scores (the dotted line), 2) species that had a lower ADBI sub-score (below the dotted line – group 4, Appendix B2), and 3) species that had a higher ADBI sub-score (above the dotted line – group 5, Appendix B2) (Fig. 3.3). Of the 162 South African species, 33% had a perfect correlation between the DBI and ADBI sub-scores for the habitat sensitivity/species vulnerability sub-index, 57% had lower ADBI than DBI sub-index scores, and only 10% of the species had higher ADBI than DBI sub-index scores (Fig. 3.3).

The group of species that had lower ADBI than DBI sub-index scores (group 4, Appendix B2) could be divided into three main groups, which are represented by the coloured circles blue, green and orange (Fig. 3.3). Species within the blue circle are listed within two sub-groups of Appendix B2, i.e. sub-group A (DBI 1: ADBI 0; 11 species) and sub-group B (DBI 2: ADBI 0; 7 species). This group of species can be classified as tropical species that have a spill-over distribution in South Africa, e.g. *Mesocnemis singularis* and *Palpopleura lucia* (sub-group A); and *Diplacodes luminans* and *Hemistigma albipunctum* (sub-group B, group 4, Appendix B2). Furthermore, according to the DBI, these species have either a low or medium sensitivity to habitat change within South Africa, and there is a possibility that they may occur within artificial waterbodies (Table 3.1). However, according to the ADBI species vulnerability sub-index, species within this group have a 'low vulnerability' to possible anthropogenic disturbances to their preferred habitats (Table 3.1).

Species within the green circle separate into two sub-groups (Fig. 3.3 and group 4, Appendix B2), i.e. sub-group C (DBI 2: ADBI 1; 41 species) and sub-group D (DBI 3: ADBI 1; 15 species). The sub-group C species (group 4, Appendix B2) are a mixed group of species, with some being fairly geographically widespread in South Africa (e.g. *Agriocnemis exilis*), others that occur only at high elevations, and some that are widespread South African endemics (e.g. *Pseudagrion vaalense*). Also, according to the DBI, species within this sub-group C (group 4, Appendix B2) have medium sensitivity to habitat disturbances and may occur in artificial waterbodies in South Africa (Table 3.1). However, for the ADBI species vulnerability sub-index, these species are only somewhat vulnerable to anthropogenic disturbances to their preferred habitats (Table 3.1).

Species in sub-group D (group 4, Appendix B2) are all highly localised in South Africa (e.g. *Bradinopyga cornuta* and *Gynacantha manderica*). Also, according to the DBI, species in this group are extremely sensitive to any habitat change and only occur in undisturbed natural habitats (Table 3.1). However, according to the ADBI species vulnerability sub-index, these species show only some vulnerability to anthropogenic disturbances to their habitats (Table 3.1). Species in the orange circle

(Fig. 3.3) are either overall rare or have a spotty distribution in South Africa, with most being narrow-range South African endemics, e.g. *Chlorolestes apricans*, *Ecchlorolestes peringueyi*, and *Spesbona angusta* (sub-group E, group 4, Appendix B2). Also, according to the DBI, species in this group are also extremely sensitive to any habitat change and usually occur only in undisturbed natural habitats (Table 3.1). Furthermore, according to the ADBI species vulnerability sub-index, these species, although with lower scores than in the case of the DBI sub-index, are vulnerable to anthropogenic disturbances to their habitats (Table 3.1).

The group of species that had higher ADBI than DBI sub-index scores (group 5, Appendix B2) could be divided into three main groups, represented by the coloured circles red, pink and purple (Fig. 3.3). Species within the red circle are listed in two sub-groups of Appendix B2, i.e. sub-group A (DBI 0: ADBI 1; 8 species) and sub-group B (DBI 1: ADBI 2; 6 species). This group of species (red circle) can be classified as tropical species that have a widespread to discontinuous distribution in the South Africa, e.g. sub-group A: *Ischnura senegalensis* and sub-group B: *Notiothemis jonesi* (group 5, Appendix B2). Also, according to the DBI, these species may either have no or low sensitivity to habitat change in South Africa, and they may occur in some artificial waterbodies (Table 3.1). However, according to the ADBI species vulnerability sub-index, species within this group do show some vulnerability to anthropogenic disturbances to their preferred habitats (Table 3.1).

In the case of the last two sub-groups, C (pink circle) and D (purple circle), each has one recorded species (Fig. 3.3 and group 5, Appendix B2). The one species in sub-group C, *Trithemis dorsalis* (DBI 0: ADBI 2), occurs in large, well-vegetated reservoirs, and is highly tolerant of such artificial water bodies (Table 3.1). However, according to the ADBI species vulnerability sub-index, this species is, nevertheless, vulnerable to anthropogenic disturbances (Table 3.1). The one species in sub-group D, *Phyllomacromia monoceros* (DBI 2: ADBI 3) is a tropical species, and is very rare in South Africa. Also, according to the DBI, this species has a medium sensitivity to habitat change within South Africa, but according to the ADBI species vulnerability sub-index, this species is extremely vulnerable to anthropogenic disturbances (Table 3.1).

Overall, there is a great difference between the scoring of this third sub-index of the ADBI (species vulnerability) and the DBI (habitat sensitivity). For the most part, those South African species that are sensitive to habitat disturbances according to the DBI scoring are not as vulnerable to anthropogenic disturbances as suggested by their ADBI species vulnerability scores. On the other hand, those South African species that show very little sensitivity to habitat disturbance, are vulnerable to anthropogenic disturbances according to the ADBI species vulnerability scores. Consequently, although there is a moderate correlation between the scoring of this third sub-index of the DBI (habitat sensitivity) and ADBI (species vulnerability), the scoring of the ADBI species vulnerability sub-index are influenced by the scale at which they occur, i.e. measuring the adverse

anthropogenic impacts to the species' preferred habitats and their possible reactions across the African continent. Overall, the ADBI species vulnerability scores differ from those of the DBI habitat sensitivity classifications, and therefore, this sub-index influences the calculations of the final ADBI scores.

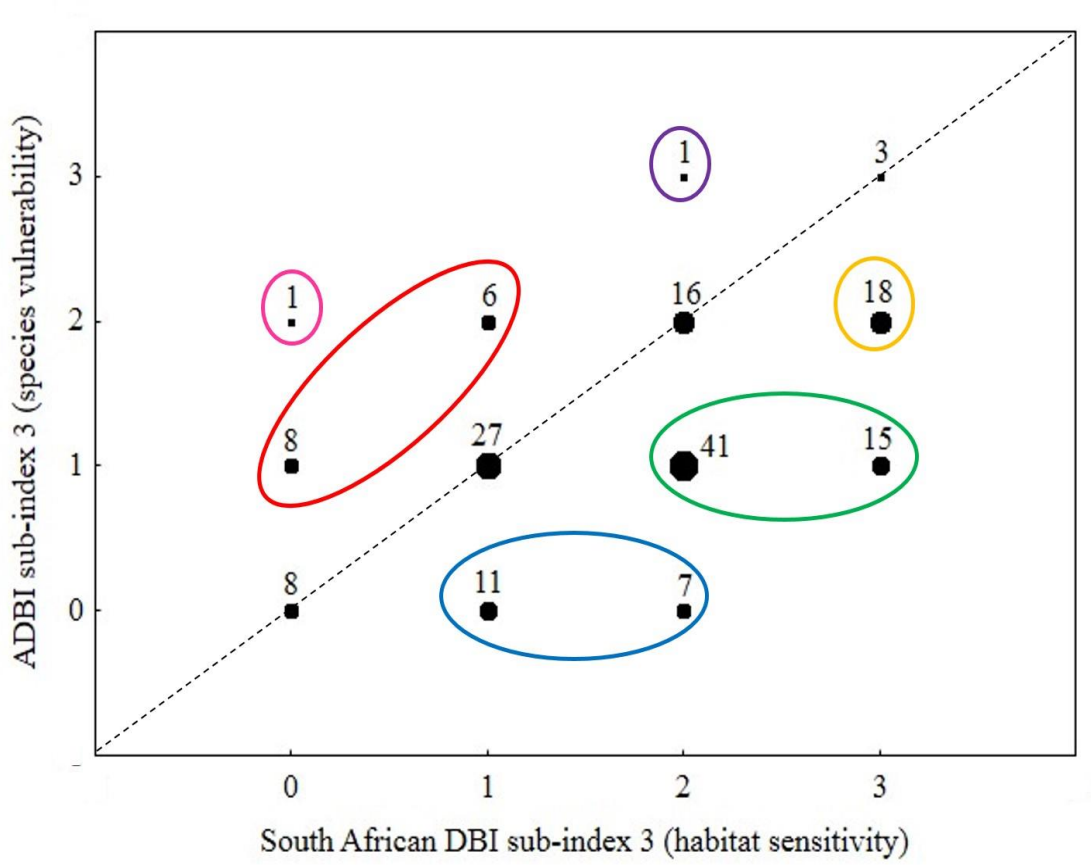


Figure 3.3. Number of species recorded per sub-index score (0 to 3) of the South African Dragonfly Biotic Index (DBI) versus the African Dragonfly Biotic Index (ADBI), for the third sub-index, 'habitat sensitivity/species vulnerability'. The species could be divided into three main clusters for this sub-index: 1) species that had a perfect correlation between the DBI and ADBI sub-scores 0 to 3 (the dotted line), 2) species that had a lower ADBI sub-score (below the dotted line), and 3) species that had a higher ADBI sub-score (above the dotted line). Of all 162 South African species, 57% had lower ADBI scores for the third sub-index.

3.4 Comparing the South African Dragonfly Biotic Index (DBI) with the African Dragonfly Biotic Index (ADBI): the final scores

As with the three sub-indices, the original range of scores (0 to 9) of the DBI were compared with the full range of scores (0 to 9) of the ADBI. This comparison revealed that the South African dragonfly species, according to their full scores, could be divided into three main clusters (Fig. 3.4), as was the case with the first and third sub-indices. These three clusters are: 1) species showing very high correlation in their DBI and ADBI scores (the dotted line), 2) species that had a lower ADBI score (below the dotted line), and 3) species that had a higher ADBI score (above the dotted line) (Fig. 3.4). Also, as with the first and third sub-indices, most of the 162 species (71%) had lower ADBI scores, while only 9% had higher ADBI scores. Furthermore, only 20% (32) of the species showed high correlation between the full scores of the DBI and ADBI (Fig. 3.4). A list of all the 162 species with their DBI and ADBI scores is given in Appendix B1.

As was seen in the previous section, both sub-index 1 (geographical distribution) and sub-index 3 (habitat sensitivity/species vulnerability) had the greatest influence on the calculations of the ADBI scores. To determine which of these two sub-indices had the most influence in the divergence of scoring between the South African DBI and ADBI, the ecology of all 162 species were compared with each other (Fig. 3.5). This ecology includes the total of the respective DBI and ADBI sub-scores of sub-index 1 (geographical distribution) and sub-index 3 (habitat sensitivity/species vulnerability). Thus, excluded were the sub-scores (0 to 3) of Red List threat statuses of 'Least Concern', 'Near Threatened', 'Vulnerable', 'Endangered' and 'Critically Endangered' for both these two biotic indices. There is a distinct pattern regarding the ecology (i.e. geographical distribution and habitat sensitivity/species vulnerability) of the species. The spread of the species is similar to that for the complete set of scores of the DBI compared with those of the ADBI (as in Figure 3.4). However, most species had lower ADBI ecology scores than those of the DBI, noting that as only two sub-index scores were used here, the total possible score was 6 (Fig. 3.5).

As in Figure 3.4, the ecology of the species could also be divided into three main clusters (Fig. 3.5): 1) species that had a lower ADBI ecology score (below the dotted line – group 1, Appendix B3), 2) species that had a higher ADBI ecology score (above the dotted line – group 2, Appendix B3), and 3) species that had a perfect correlation between the DBI and ADBI ecology scores (dotted line – group 3, Appendix B3). Consequently, the ecology of the ADBI, both the geographical distribution and species vulnerability of the species, had an influence on the scoring of the ADBI and so contribute to the main difference between ADBI and the DBI (Fig. 3.5). However, this still does not explain which of two sub-indices has the greater influence on the ADBI scores. The explanation, however, can be seen in the rank values for the sub-indices, i.e. there was a moderate correlation between DBI and ADBI sub-index 1 (distribution), and between DBI and ADBI sub-index 3 (habitat

sensitivity/species vulnerability). Yet, of these two, the weakest correlation was between DBI and ADBI sub-index 3 (habitat sensitivity/species vulnerability), which had a rank value of r = 0.465 (Table 3.4). Therefore, it is possible that the ADBI species vulnerability sub-index is the one with the greatest influence on the difference between the final scores of the DBI and ADBI.

To determine the veracity of the third sub-index of the ADBI, and how it influenced the final ADBI scores, the sub-scores of the species vulnerability sub-index of the ADBI was replaced by the sub-scores of the habitat sensitivity sub-index of the DBI (Fig. 3.6). In other words, the original DBI scores for the 162 species were compared with new ADBI scores, which includes ADBI sub-index 1 (geographical distribution) and sub-index 2 (threat status) plus DBI sub-index 3 (habitat sensitivity). This revealed that the dragonfly species could be assigned to three main clusters (Fig. 3.6): 1) the species that had lower new ADBI scores (below the dotted line – group 1, Appendix B4), 2) the species that had higher new ADBI scores (above the dotted line – group 2, Appendix B4), and 3) the species that had a perfect correlation between the original DBI scores and the "new ADBI" scores (dotted line – group 3, Appendix B4).

This new analysis showed that by replacing the species vulnerability sub-index scores of the ADBI with the habitat sensitivity sub-index scores of the DBI, the "new ADBI" scoring of the species is closer to that of the original DBI scores. This meant that 60% of the species had lower "new ADBI" scores (11% less than when the DBI was compared with the original ADBI), while only 7% had higher "new ADBI" scores (2% less than when the DBI was compared with the original ADBI). Furthermore, 33% of the species (13% more than when the DBI was compared with the original ADBI) had the same DBI and "new ADBI" scores. Thus, the number of species with both lower and higher "new ADBI" scores decreased, while the number of species with a perfect correlation increased (Fig. 3.6). The differences between the DBI scores and the "new ADBI" scores are given as various species lists in Appendix B4.

Most of the species in sub-groups A to S of group 1 in Appendix B4 (lower new ADBI scores) increased by 1 to 2 points over their initial ADBI scores, and are closer to the original DBI scores. However, there are some species for which their initial ADBI scores are the same as the DBI scores, but they had a lower "new ADBI" score, e.g. *Orthetrum julia* (sub-group A) and *Crocothemis divisa* (sub-group B) (group 1, Appendix B4). Also, there are some species for which their initial ADBI scores are the same as the "new ADBI" scores, e.g. *Anax ephippiger* (sub-group C), *Macrodiplax cora* (sub-group H), *Chlorolestes umbratus* (sub-group K), *Chlorolestes elegans* (sub-group N) and *Syncordulia venator* (sub-group R) (group 1, Appendix B4).

Furthermore, the species that had low to average (0 to 4) "new ADBI" scores (sub-group A to E and G to H in group 1 of Appendix B4) are all classified as of 'Least Concern' (both national and global status) according to the IUCN/SSC Red List threat statuses. Thus, the only source of the

difference between these species' DBI and "new ADBI" scores are their geographical distribution, which have a wide to very wide distribution range according to the ADBI distribution description (Table 3.1). On the other hand, the majority of the species that had "new ADBI" scores of 5 to 9 (sub-group I to S, group 1, Appendix B4) have national threat statuses of 'Near Threatened', 'Vulnerable', 'Endangered' and 'Critically Endangered', which contributes to their higher DBI scores. Therefore, in this case, both the geographical distribution (the majority of the species have a wide to very wide distribution range) and the national threat statuses of these species are the sources of differences between the species' DBI and their "new ADBI" scores.

Species that had higher "new ADBI" scores (sub-groups A to E, group 2, Appendix B4), could be loosely categorized into two groups. The first group of species in sub-group A, as well as a few in sub-group B (*Africallagma glaucum* and *Pseudagrion massaicum*), have decreased in 1 to 2 points from their initial ADBI scores and are, therefore, closer to the original DBI scores (group 2, Appendix B4). The second group of species, a few in sub-group B as well as those in sub-group C to E, all increased in 1 to 2 points from their initial ADBI scores (group 2, Appendix B4). This group of species is, therefore, not as close to the original DBI scores. As most of these species (sub-group A to D) are classified as 'Least Concern' (group 2, Appendix B4), the main source of difference between these species' DBI and "new ADBI" scores is their geographical distribution, which is narrow to wide according to their ADBI geographical distribution (Table 3.1).

Most species listed in the sub-groups A to J in group 3 of Appendix B4 have either increased or decreased by 1 to 2 points, making the "new ADBI" scores the same as the original DBI scores, e.g. *Crocothemis erythraea* (sub-group A), *Pseudagrion citricola* (sub-group D), *Onychogomphus supinus* (sub-group F) and *Syncordulia legator* (sub-group I) (group 3, Appendix B4). There are also some species for which the "new ADBI" scores did not change from their initial ADBI scores, e.g. *Anax imperator* (sub-group B), *Lestes virgatus* (sub-group C), *Chlorolestes fasciatus* (sub-group E), *Ecchlorolestes nylephtha* (sub-group H) and *Metacnemis valida* (sub-group J) (group 3, Appendix B4). Furthermore, all the species listed within group 3 have the same geographical distribution and Red List threat status among both the biotic indices, indicating that the species vulnerability sub-index was the main difference between the initial ADBI scores and the original DBI scores.

Consequently, replacing the species vulnerability sub-index scores with the habitat sensitivity sub-index scores has, mostly, made the gap in scoring between the original DBI scores and the initial ADBI scores smaller. Thus, the habitat sensitivity sub-index is more robust than that of the species vulnerability sub-index. Therefore, for future interest, it is better to use a more similar assessment of this third sub-index when possible national DBI scores are created for other countries, i.e. natural versus human-modified habitats and their sensitivity to habitat change (Samways and Simaika 2016). Furthermore, as the species vulnerability sub-index is subjective (assessments having been

determined by expert opinion), more information on the various species habitat preferences and conditions are needed to improve the quality of this dataset.

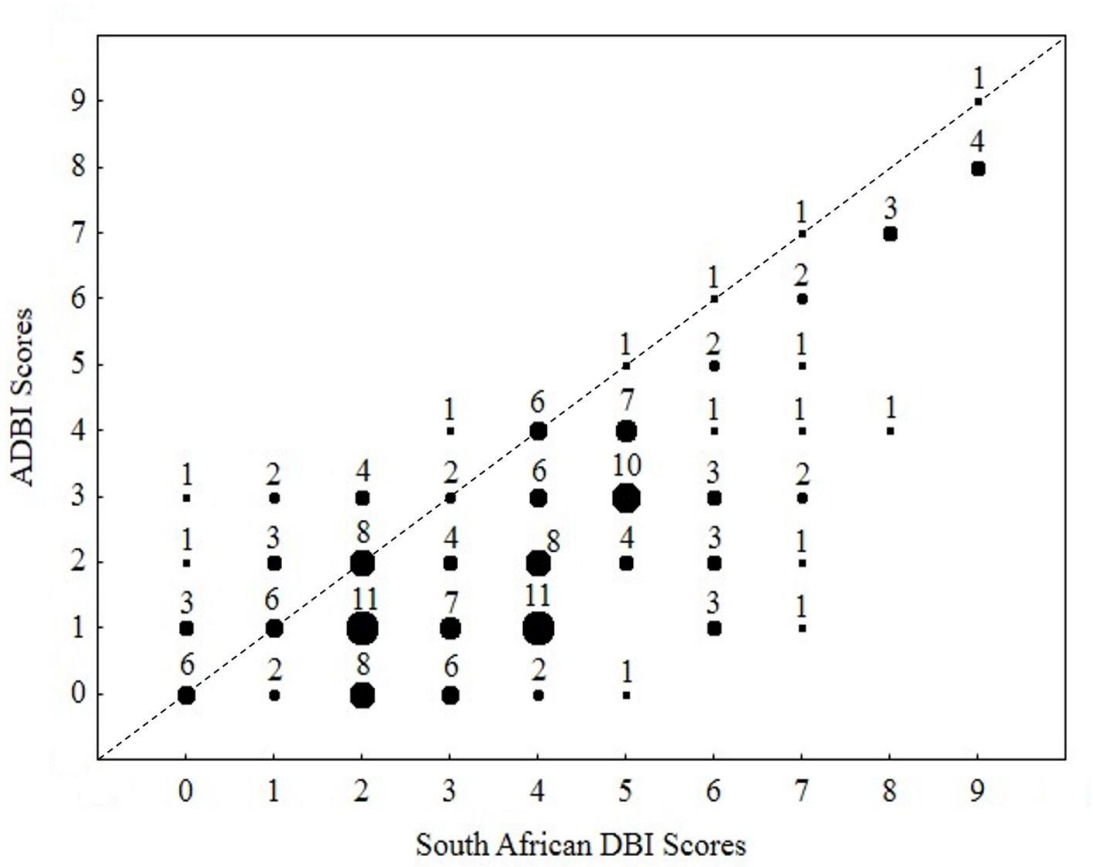


Figure 3.4. Number of species recorded for the original scores (0 to 9) of the South African Dragonfly Biotic Index (DBI) compared with those of the African Dragonfly Biotic Index (ADBI). This comparison revealed that the South African dragonfly species, as was the case with the first and third sub-indices, could be divided into three main clusters: 1) species showing very high correlation in their DBI and ADBI scores 0 to 9 (the dotted line), 2) species that had a lower ADBI score (below the dotted line), and 3) species that had a higher ADBI score (above the dotted line). Of the 162 species, only 32 had a strong correlation between the DBI and ADBI scores, while most of the species (71%) had lower ADBI scores.

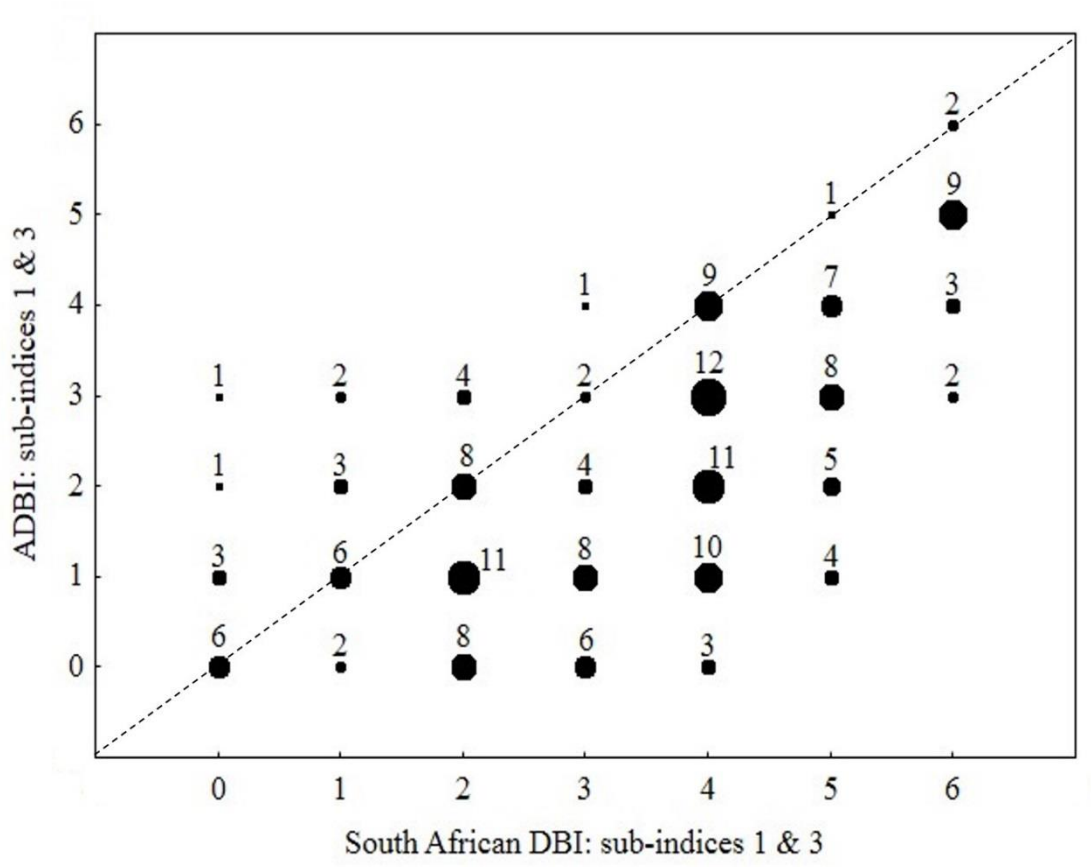


Figure 3.5. Both sub-indices 1 (geographical distribution) and 3 (habitat sensitivity/species vulnerability) had the greatest influence on calculating the African Dragonfly Biotic Index (ADBI) scores. To determine which of these two sub-indices had the most influence in the divergence of scoring between the South African Dragonfly Biotic Index (DBI) and ADBI, the ecology of all 162 species were compared with each other, i.e. the total of sub-indices 1 and 3 of these two biotic indices were compared with each other. The sub-indices are: DBI and ADBI sub-index 1 – geographical distribution; DBI sub-index 3 – habitat sensitivity; and ADBI sub-index 3 – species vulnerability. The spread of the species was similar to that for the complete set of scores of the DBI compared with those of the ADBI (as in Figure 3.4). Most species (64%) had lower ADBI ecology scores than those of the DBI, noting that as only two sub-index scores are used here, the total possible score is 6.

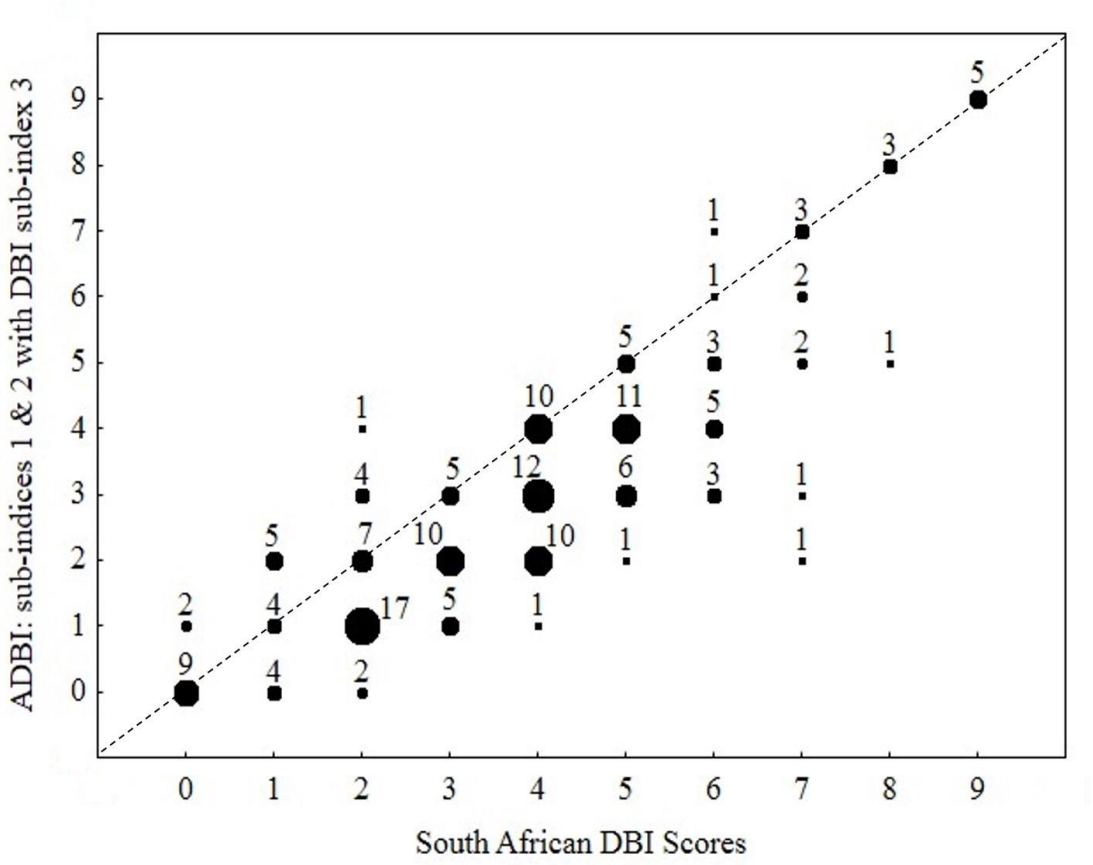


Figure 3.6. To determine the veracity of the third sub-index (species vulnerability) of the African Dragonfly Biotic Index (ADBI), it was replaced by the third sub-index (habitat sensitivity) of the South African Dragonfly Biotic Index (DBI). Consequently, the full range of DBI scores was compared with the "new ADBI" scores, which includes ADBI sub-indices 1 (geographical distribution) and 2 (threat status) plus the third sub-index of the DBI (habitat sensitivity). This revealed that the dragonfly species can be assigned to three main clusters: 1) the species that had lower new ADBI scores (below the dotted line), 2) the species that had higher new ADBI scores (above the dotted line), and 3) the species that had a perfect correlation between the original DBI scores and the "new ADBI" scores (dotted line). Furthermore, this showed that by replacing the species vulnerability sub-index scores of the ADBI with the habitat sensitivity sub-index scores of the DBI, the "new ADBI" scoring of the species is closer to that of the original DBI scores.

4. CONCLUSION

The African Dragonfly Biotic Index (ADBI) has a strong association with the original South African Dragonfly Biotic Index (DBI). Thus, the null hypothesis (the ADBI have a one-to-one relationship with the South African DBI) is accepted. Therefore, the ADBI has relevance mainly when freshwater ecosystems are being assessed at the continental scale, as, there are fundamental differences between the three sub-indices of these two biotic indices. The sub-index with the least influence on the scoring of the ADBI (with respect to the South African species) is the IUCN/SSC Red List threat status sub-index, as most species are comparable regarding their national and global threat statuses (Fig. 3.2). That is, the DBI and ADBI sub-scores (0 to 3) of this sub-index are strongly correlated with each other. The species with higher DBI 'threat status' sub-index scores are classified as more vulnerable to habitat disturbances and therefore, of national concern, which is essentially a politically determined estimation, i.e. an assessment for national action (Samways and Simaika 2016). Thus, these species are classified as 'Near Threatened', 'Vulnerable', 'Endangered' or 'Critically Endangered' (described for the DBI in Table 3.1).

The 'geographical distribution' sub-index of the ADBI, which operating at the continental scale (Fig. 3.1), differs from that of the same sub-index of the DBI. This is because the distributions of dragonflies in South Africa were assessed at the provincial level, i.e. the spread of the species within the political borders of the nine provinces of the country (Samways and Simaika 2016). On the other hand, as this is not feasible or even possibly meaningful on a continental scale, the latitude-longitude range sizes that were established to calculate the ADBI geographical distribution sub-index resulted in most species occurring in areas far larger than provincial borders. In other words, the latitude-longitude range sizes in which the species occur can be classified as being "very wide" or "wide", and even to "narrow" distribution range (as described in Table 3.1 for the ADBI distribution sub-index). There are also species that have a narrower distribution range size according to the ADBI distribution description (in Table 3.1), i.e. the latitude-longitude range size in which these species occur are more narrow than the described wider spread within the South African provincial borders. However, the DBI and ADBI sub-scores (0 to 3) of this sub-index are moderately correlated with each other. Therefore, the distribution of the species does not have such as great influence on the scoring of the ADBI.

The third sub-index of the ADBI, the 'species vulnerability' sub-index, has the greatest influence on the ADBI scores (Fig. 3.3 and Fig. 3.6). Most species are less vulnerable when assessed at a continental scale, while only a few are classified as being more vulnerable. As some of the species occur in a much wider range of habitat types, generalising their reactions to specific anthropogenic disturbances to a specific habitat system can be difficult. This was further supported here when the

species vulnerability sub-index of the ADBI was replaced by the habitat sensitivity sub-index of the South African DBI (Fig. 3.6). Most of the assessed South African species increased by 1 to 2 points over their initial ADBI scores, making the "new ADBI" scoring closer to the original DBI scores.

In view of the above, while the ADBI is appropriate for a full continental scale assessment, it has shortcomings for national level assessments, the level of much conservation policy and management (Sutherland 2000). What this means is that countries currently without a DBI (i.e. all except South Africa) need to translate the ADBI scores into national DBI scores. This can be done by: 1) recalibrating local distributions of species from the gross latitude-longitude values to locally appropriate values (this was provincial in South Africa, but this may well not be appropriate in other countries); 2) introducing national assessments of the threat status of all the local species; and 3) converting the subjective vulnerability sub-index for any one country into an objective habitat sensitivity sub-index. This last conversion is particularly important.

REFERENCES

Carpenter, S.R., Stanley, E.H. and Vander Zanden, M.J. 2011. State of the World's freshwater ecosystems: physical, chemical, and biological changes. *Annual Review of Environment and Resources* **36**: 75-99.

Chovanec, A., Schindler, M, Waringer, J. and Wimmer, R. 2015. The Dragonfly Association Index (Insecta: Odonata) – A tool for the type-specific assessment of lowland rivers. *River Research and Applications* **31**: 627-638.

Clark, T.E. and Samways, M.J. 1996. Dragonflies (Odonata) as indicators of biotope quality in the Kruger National Park, South Africa. *Journal of Applied Ecology* **33**: 1001-1012.

Clausnitzer, V., Dijkstra, K.-D.B., Koch, R., Boudot, J.-P., Darwall, W.R.T., Kipping, J., Samraoui, B., Samways, M.J., Simaika, J.P. and Suhling, F. 2012. Focus on African freshwaters: hotspots of dragonfly diversity and conservation concerns. *Frontiers in Ecology and the Environment* **10**: 129-134.

Darwall, W.R.T, Smith, K.G., Tweddle, D. and Skelton, P. (eds.). 2009. *The Status and Distribution of Freshwater Biodiversity in Southern Africa.* IUCN, Gland, Switzerland and SAIAB, Grahamstown, South Africa.

Dell Inc. 2016. *Dell STATISTICA (data analysis software system)*, version 13. www.statsoft.com.

De Olieveira-Junior, J.M.B., Shimano, Y., Gardner, T.A., Hughes, R.M., De Marco Júnior, P. and Juen, L. 2015. Neotropical dragonflies (Insecta: Odonata) as indicators of ecological condition of small streams in the eastern Amazon. *Austral Ecology* **40**: 733-744.

Dijkstra, K.-D.B., Boudot, J.-P., Clausnitzer, V., Kipping, J., Kisakye, J.J., Ogbogu, S.S., Samraoui, B., Samways, M.J., Schütte, K., Simaika, J.P., Suhling, F. and Tchibozo, S.L. 2011. Dragonflies and damselflies of Africa (Odonata): history, diversity, distribution, and conservation. In: W.R.T Darwall, K.G. Smith, D.J. Allen, R.A. Holland, I.J. Harrison and E.G.E Brooks (eds.), *The Diversity of Life in African Freshwaters: Under Water, Under Threat. An analysis of the status and distribution of freshwater species throughout mainland Africa*, pp. 126-177. IUCN, Cambridge, UK and Gland, Switzerland.

Dudgeon, D., Arthington, A.H., Gessner, M.O., Kawabata, Z.-I., Knowler, D.J., Lévêque, C., Naiman, R.J., Prieur-Richard, A.-H., Soto, D., Stiassny, M.L.J. and Sullivan, C.A. 2006. Freshwater biodiversity: importance, threats, status and conservation challenges. *Biological Reviews* **81**: 163-182.

Dutra, S. and De Marco, P. 2015. Bionomic differences in odonates and their influence on the efficiency of indicator species of environmental quality. *Ecological Indicators* **49**: 132-142.

Golfieri, B., Hardersen, S., Maiolini, B. and Surian, N. 2016. Odonates as indicators of the ecological integrity of the river corridor: Development and application of the Odonate River Index (ORI) in northern Italy. *Ecological Indicators* **61**: 234-247.

IUCN (International Union for Conservation of Nature and Natural Resources). 2016. *IUCN Red List Categories and Criteria: Version 3.1*. Second edition. IUCN, Gland, Switzerland and Cambridge, UK.

Kipping, J., Dijkstra, K.-D.B., Clausnitzer, V., Suhling, F. and Schütte, K. 2009. Odonata Database of Africa (ODA). *Agrion* **13**: 20-23.

Kutcher, T.E. and Bried, J.T. 2014. Adult Odonata conservatism as an indicator of freshwater wetland condition. *Ecological Indicators* **38**: 31-39.

Martín, R. and Maynou, X. 2016. Dragonflies (Insecta: Odonata) as indicators of habitat quality in Mediterranean streams and rivers in the province of Barcelona (Catalonia, Iberian Peninsula). *International Journal of Odonatology* **19**: 107-124.

Oertli, B. 2008. The use of dragonflies in the assessment and monitoring of aquatic habitats. In: A. Córdoba-Aguilar (ed.), *Dragonflies and Damselflies: Model organisms for Ecological and Evolutionary Research*, pp. 79-95. Oxford University Press, Oxford.

Revenga, C., Campbell, I., Abell, R., De Villiers, P. and Bryer, M. 2005. Prospects for monitoring freshwater ecosystems towards the 2010 Targets. *Philosophical Transactions of the Royal Society B: Biological Sciences* **360**: 397-413.

Samways, M.J. 2005. Dragonflies: sensitive indicators of freshwater health. In: M.L. Thieme, R. Abell, M.L.J. Stiassny, P. Skelton, B. Lehner, G.G. Teugels, E. Dinerstein, A.K. Toham, N. Burgess and D. Olson (eds.), *Freshwater Ecoregions of Africa and Madagascar: A conservation assessment*, pp. 19-21. Island Press, Washington DC, USA.

Samways, M.J. and Simaika, J.P. 2016. *Manual of Freshwater Assessment for South Africa: Dragonfly Biotic Index*. *Suricata* 2. South African National Biodiversity Institute, Pretoria, South Africa.

Samways, M.J. and Taylor, S. 2004. Impacts of invasive alien plants on Red-listed South African dragonflies (Odonata). *South African Journal of Science* **100**: 78-80.

Silva, D. de paiva, De Marco, P. and Resende, D.C. 2010. Adult odonate abundance and community assemblage measures as indicators of stream ecological integrity: A case study. *Ecological Indicators* **10**: 744-752.

Simaika, J.P. and Samways, M. J. 2009. An easy-to-use index of ecological integrity for prioritizing freshwater sites and for assessing habitat quality. *Biodiversity and Conservation* **18**: 1171-1185.

Simaika, J.P. and Samways, M.J. 2011. Comparative assessment of indices of freshwater habitat conditions using different invertebrate taxon sets. *Ecological Indicators* **11**: 370-378.

Simaika, J.P. and Samways, M.J. 2012. Using dragonflies to monitor and prioritize lotic systems: a South African perspective. *Organisms, Diversity and Evolution* **12**: 251-259.

Simaika, J.P., Samways, M.J., Kipping, J., Suhling, F., Dijkstra, K.-D.B., Clausnitzer, V., Boudot, J.-P. and Domisch, S. 2013. Continental-scale conservation prioritization of African dragonflies. *Biological Conservation* **157**: 245-254.

Smith, J., Samways, M.J. and Taylor, S. 2007. Assessing riparian quality using two complementary sets of bioindicators. *Biodiversity and Conservation* **16**: 2695-2713.

Sutherland, W.J. 2000. *The Conservation Handbook: Research, Management and Policy.* Blackwell Science Ltd., Malden, USA.

Vörösmarty, C.J., McIntyre, P.B., Gessner, M.O., Dudgeon, D., Prusevich, A., Green, P., Glidden, S., Bunn, S.E., Sullivan, C.A., Reidy Liermann, C. and Davies, P.M. 2010. Global threats to human water security and river biodiversity. *Nature* **467**: 555-561.

APPENDIX B1: The South African dragonflies with their relevant South African DBI and ADBI sub-index scores and final scores.

The South African dragonfly species (N = 162) with their respective South African Dragonfly Biotic Index (DBI) and African Dragonfly Biotic Index (ADBI) sub-index scores and final scores. The sub-indices are: distribution (DBI 1 and ADBI 1); threat status (DBI 2 and ADBI 2); habitat sensitivity (DBI 3) and species vulnerability (ADBI 3). Also included, are the National and Global Red List categories and criteria, which represents the threat statuses for DBI and ADBI respectively. IUCN/SSC threat status abbreviations used (IUCN 2016): LC – Least Concern, NT – Near Threatened, VU – Vulnerable, EN – Endangered and CR – Critically Endangered. The three DBI sub-indices and final scores, as well as the National Red List categories and criteria, were taken from Samways and Simaika (2016).

Species No.	Species	National Red List		DBI				Global Red List		ADBI			
		Category	Criteria	1	2	3	Score	Category	Criteria	1	2	3	Score
1	*Aciagrion dondoense* Dijkstra, 2007	VU	B2ab(ii,iii); D2	2	1	2	5	LC		2	0	1	3
2	*A. gracile* (Sjöstedt, 1909)	VU	B2ab(ii,iii); D2	2	1	3	6	LC		1	0	1	2
3	*Acisoma inflatum* Sélys, 1882	LC		1	0	1	2	LC		0	0	0	0
4	*A. variegatum* Kirby 1898	LC		1	0	1	2	LC		1	0	2	3
5	*Aethriamanta rezia* Kirby, 1889	LC		2	0	2	4	LC		0	0	1	1
6	*Africallagma fractum* (Ris, 1921)	LC		2	0	2	4	LC		2	0	2	4
7	*A. glaucum* (Burmeister, 1839)	LC		0	0	1	1	LC		1	0	2	3
8	*A. sapphirinum* (Pinhey, 1950)	LC		2	0	2	4	LC		2	0	1	3
9	*A. sinuatum* (Ris, 1921)	LC		2	0	3	5	LC		2	0	2	4
10	*Agriocnemis exilis* Sélys, 1872	LC		2	0	2	4	LC		0	0	1	1
11	*A. falcifera* Pinhey, 1959	LC		3	0	1	4	LC		2	0	1	3
12	*A. gratiosa* Gerstäcker, 1891	VU	D2	2	1	2	5	LC		1	0	1	2
13	*A. pinheyi* Balinsky, 1963	LC		1	0	1	2	LC		2	0	1	3
14	*A. ruberrima* Balinsky, 1961	EN	A2ab; B1ab(i,ii,iii,iv) + 2ab(i,ii,iii,iv)	3	2	3	8	LC		2	0	2	4

APPENDIX B1: (*continued*)

Species No.	Species	National Red List		DBI				Global Red List		ADBI			
		Category	Criteria	1	2	3	Score	Category	Criteria	1	2	3	Score
15	*Allocnemis leucosticta* Sélys, 1863	LC		2	0	3	5	LC		2	0	3	5
16	*Anaciaeschna triangulifera* McLachlan, 1896	LC		2	0	2	4	LC		1	0	0	1
17	*Anax ephippiger* (Burmeister, 1839)	LC		1	0	1	2	LC		0	0	1	1
18	*A. imperator* Leach, 1815	LC		0	0	1	1	LC		0	0	1	1
19	*A. speratus* Hagen, 1867	LC		0	0	2	2	LC		1	0	1	2
20	*A. tristis* Hagen, 1867	LC		2	0	2	4	LC		0	0	1	1
21	*Azuragrion nigridorsum* (Sélys, 1876)	LC		1	0	2	3	LC		1	0	1	2
22	*Brachythemis lacustris* (Kirby, 1889)	LC		1	0	2	3	LC		0	0	1	1
23	*B. leucosticta* (Burmeister, 1839)	LC		1	0	1	2	LC		0	0	1	1
24	*Bradinopyga cornuta* Ris, 1911	LC		2	0	3	5	LC		1	0	1	2
25	*Ceratogomphus pictus* Sélys, 1854	LC		0	0	2	2	LC		2	0	1	3
26	*C. triceraticus* Balinsky, 1963	NT		3	1	3	7	NT		2	1	1	4
27	*Ceriagrion glabrum* (Burmeister, 1839)	LC		0	0	0	0	LC		0	0	0	0
28	*C. suave* Ris, 1921	EN	D2	3	2	2	7	LC		0	0	1	1
29	*Chalcostephia flavifrons* Kirby, 1889	LC		2	0	2	4	LC		0	0	1	1
30	*Chlorocypha consueta* (Karsch, 1899)	CR	D2	3	2	2	7	LC		1	0	1	2
31	*Chlorolestes apricans* Wilmot, 1975	EN	B2ab(i,ii,iii,iv)	3	3	3	9	EN	B2ab(i,ii,iii,iv)	3	3	2	8
32	*C. conspicuus* Hagen in Sélys, 1862	LC		3	0	3	6	LC		2	0	2	4
33	*C. draconicus* Balinsky, 1956	LC		3	0	3	6	LC		3	0	2	5
34	*C. elegans* Pinhey, 1950	VU	A2a; B2ab(i,ii,iii,iv); D2	3	1	2	6	NT		2	1	2	5

APPENDIX B1: (*continued*)

Species No.	Species	National Red List		DBI				Global Red List		ADBI			
		Category	Criteria	1	2	3	Score	Category	Criteria	1	2	3	Score
35	*Chlorolestes fasciatus* (Burmeister, 1839)	LC		2	0	2	4	LC		2	0	2	4
36	*C. tessellatus* (Burmeister, 1839)	LC		2	0	2	4	LC		2	0	2	4
37	*C. umbratus* Hagen in Sélys, 1862	LC		3	0	2	5	LC		2	0	2	4
38	*Crenigomphus cornutus* Pinhey, 1956	VU	B1ab(i,ii,iii,iv)	2	1	2	5	LC		2	0	1	3
39	*C. hartmanni* (Förster, 1898)	LC		1	0	2	3	LC		1	0	1	2
40	*Crocothemis divisa* Karsch, 1898	LC		2	0	0	2	LC		0	0	1	1
41	*C. erythraea* (Brullé, 1832)	LC		0	0	0	0	LC		0	0	1	1
42	*C. sanguinolenta* (Burmeister, 1839)	LC		1	0	2	3	LC		0	0	1	1
43	*Diplacodes lefebvrii* (Rambur, 1842)	LC		1	0	2	3	LC		0	0	1	1
44	*D. luminans* (Karsch, 1893)	LC		1	0	2	3	LC		0	0	0	0
45	*D. pumila* Dijkstra, 2006	EN	B1ab(i,ii,iii,iv) + 2ab(i,ii,iii,iv)	2	2	3	7	LC		2	0	1	3
46	*Ecchlorolestes nylephtha* (Barnard, 1937)	NT		3	1	3	7	NT		3	1	3	7
47	*E. peringueyi* (Ris, 1921)	NT		3	1	3	7	NT		3	1	2	6
48	*Elattoneura frenulata* (Hagen in Sélys, 1860)	LC		3	0	2	5	LC		2	0	2	4
49	*E. glauca* (Sélys, 1860)	LC		0	0	1	1	LC		1	0	1	2
50	*Gomphidia quarrei* (Schouteden, 1934)	VU	B1ab(i,ii,iii,iv)	2	1	3	6	LC		1	0	1	2
51	*Gynacantha manderica* Grünberg, 1902	LC		1	0	3	4	LC		0	0	1	1
52	*G. usambarica* Sjöstedt, 1909	VU		2	1	3	6	LC		1	0	2	3
53	*G. villosa* Grünberg, 1902	VU	B2ab(ii,iii,iv)	2	1	3	6	LC		1	0	2	3
54	*Hemicordulia africana* Dijkstra, 2007	NT		2	1	2	5	LC		1	0	2	3

APPENDIX B1: (*continued*)

Species No.	Species	National Red List		DBI				Global Red List		ADBI			
		Category	Criteria	1	2	3	Score	Category	Criteria	1	2	3	Score
55	*Hemistigma albipunctum* (Rambur, 1842)	LC		1	0	2	3	LC		0	0	0	0
56	*Ictinogomphus ferox* (Rambur, 1842)	LC		1	0	1	2	LC		0	0	1	1
57	*Ischnura senegalensis* (Rambur, 1842)	LC		0	0	0	0	LC		0	0	1	1
58	*Lestes dissimulans* Fraser, 1855	VU	D2	2	1	2	5	LC		0	0	0	0
59	*L. ictericus* Gerstäcker, 1869	VU	D2	2	1	3	6	LC		0	0	1	1
60	*L. pallidus* Rambur, 1842	LC		1	0	1	2	LC		0	0	1	1
61	*L. plagiatus* (Burmeister, 1839)	LC		1	0	1	2	LC		1	0	1	2
62	*L. tridens* McLachlan, 1895	LC		2	0	1	3	LC		0	0	0	0
63	*L. uncifer* Karsch, 1899	VU		2	1	2	5	LC		1	0	1	2
64	*L. virgatus* (Burmeister, 1839)	LC		1	0	1	2	LC		1	0	1	2
65	*Lestinogomphus angustus* Martin, 1911	NT		2	1	2	5	LC		1	0	1	2
66	*Macrodiplax cora* (Kaup in Brauer, 1867)	LC		2	0	2	4	LC		1	0	2	3
67	*Mesocnemis singularis* Karsch, 1891	LC		2	0	1	3	LC		0	0	0	0
68	*Metacnemis valida* Hagen in Sélys, 1863	EN	A2c; B1ab(i,ii,iii) + 2ab(i,ii,iii)	3	3	3	9	EN	A2c; B1ab(i,ii,iii) + B2ab(i,ii,iii)	3	3	3	9
69	*Nesciothemis farinosa* (Förster, 1898)	LC		0	0	1	1	LC		0	0	1	1
70	*Neurogomphus zambeziensis* Cammaerts, 2004	VU	B1ab(i,ii,iii,iv)	2	1	3	6	LC		2	0	1	3
71	*Notiothemis jonesi* Ris, 1919	LC		2	0	1	3	LC		1	0	2	3
72	*Notogomphus praetorius* (Sélys, 1878)	LC		1	0	3	4	LC		1	0	1	2
73	*Olpogastra lugubris* Karsch, 1895	NT		2	1	1	4	LC		0	0	1	1

APPENDIX B1: (*continued*)

Species No.	Species	National Red List		DBI				Global Red List		ADBI			
		Category	Criteria	1	2	3	Score	Category	Criteria	1	2	3	Score
74	*Onychogomphus supinus* Sélys, 1854	LC		2	0	3	5	LC		2	0	1	3
75	*Orthetrum abbotti* Calvert, 1892	LC		1	0	1	2	LC		0	0	1	1
76	*O. brachiale* (Palisot de Beauvois, 1817)	LC		2	0	0	2	LC		0	0	0	0
77	*O. caffrum* (Burmeister, 1839)	LC		1	0	2	3	LC		1	0	2	3
78	*O. chrysostigma* (Burmeister, 1839)	LC		1	0	1	2	LC		0	0	1	1
79	*O. guineense* Ris, 1910	LC		2	0	2	4	LC		0	0	1	1
80	*O. hintzi* Schmidt, 1951	LC		1	0	2	3	LC		0	0	1	1
81	*O. icteromelas* Ris, 1910	LC		1	0	1	2	LC		0	0	1	1
82	*O. julia* Kirby, 1900 (northern form)	LC		1	0	0	1	LC		0	0	1	1
83	*O. machadoi* Longfield, 1955	LC		2	0	1	3	LC		0	0	1	1
84	*O. monardi* Schmidt, 1951	LC		2	0	2	4	LC		0	0	1	1
85	*O. robustum* Balinsky, 1965	NT		2	1	2	5	LC		2	0	1	3
86	*O. rubens* Barnard, 1937	EN	B2ab(i,ii,iii); D2	3	3	3	9	CR	D	3	3	2	8
87	*O. stemmale* (Burmeister, 1839)	LC		2	0	2	4	LC		0	0	1	1
88	*O. trinacria* (Sélys, 1841)	LC		1	0	0	1	LC		0	0	1	1
89	*Palpopleura deceptor* (Calvert, 1899)	LC		2	0	2	4	LC		0	0	0	0
90	*P. jucunda* Rambur, 1842	LC		1	0	1	2	LC		0	0	0	0
91	*P. lucia* (Drury, 1773)	LC		1	0	1	2	LC		0	0	0	0
92	*P. portia* (Drury, 1773)	LC		1	0	1	2	LC		0	0	0	0
93	*Pantala flavescens* (Fabricius, 1798)	LC		0	0	0	0	LC		0	0	1	1
94	*Paragomphus cognatus* (Rambur, 1842)	LC		0	0	1	1	LC		1	0	1	2

APPENDIX B1: (*continued*)

Species No.	Species	National Red List		DBI				Global Red List		ADBI			
		Category	Criteria	1	2	3	Score	Category	Criteria	1	2	3	Score
95	*Paragomphus elpidius* (Ris, 1921)	LC		2	0	2	4	LC		1	0	1	2
96	*P. genei* (Sélys, 1841)	LC		1	0	2	3	LC		0	0	1	1
97	*P. magnus* (Fraser, 1952)	LC		2	0	2	4	LC		2	0	1	3
98	*P. sabicus* Pinhey, 1950	LC		2	0	2	4	LC		1	0	1	2
99	*Parazyxomma flavicans* (Martin, 1908)	VU	B2ab(ii,iii); D2	2	1	3	6	LC		0	0	1	1
100	*Phaon iridipennis* (Burmeister, 1839)	LC		1	0	1	2	LC		0	0	0	0
101	*Phyllogomphus selysi* Schouteden, 1933	LC		2	0	2	4	LC		1	0	1	2
102	*Phyllomacromia contumax* Sélys, 1879	LC		1	0	1	2	LC		0	0	0	0
103	*P. monoceros* (Förster, 1906)	NT		2	1	2	5	LC		1	0	3	4
104	*P. picta* (Hagen in Sélys, 1871)	LC		1	0	1	2	LC		1	0	1	2
105	*Pinheyschna subpupillata* (McLachlan, 1896)	LC		2	0	2	4	LC		2	0	2	4
106	*Platycypha caligata* (Sélys, 1853)	LC		1	0	1	2	LC		1	0	1	2
107	*P. fitzsimonsi* (Pinhey, 1950)	LC		2	0	2	4	LC		2	0	1	3
108	*Proischnura polychromatica* (Barnard, 1937)	EN	B1ab(i,ii,iii,iv) + 2ab(i,ii,iii,iv)	3	3	3	9	EN	B1ab(i,ii,iii,iv) + B2ab(i,ii,iii,iv)	3	3	2	8
109	*P. rotundipennis* (Ris, 1921)	LC		2	0	2	4	LC		2	0	2	4
110	*Pseudagrion acaciae* Förster, 1906	LC		2	0	1	3	LC		1	0	1	2
111	*P. assegaii* Pinhey, 1950	VU	B1ab(i,ii,iii,iv)	2	1	2	5	LC		1	0	2	3
112	*P. caffrum* (Burmeister, 1839)	LC		2	0	3	5	LC		2	0	2	4
113	*P. citricola* Barnard, 1937	LC		2	0	1	3	LC		2	0	2	4

APPENDIX B1: (*continued*)

Species No.	Species	National Red List		DBI				Global Red List		ADBI			
		Category	Criteria	1	2	3	Score	Category	Criteria	1	2	3	Score
114	*Pseudagrion coeleste* Longfield, 1947 (northern form)	LC		2	0	2	4	LC		1	0	1	2
115	*P. commoniae* (Förster, 1902)	LC		1	0	1	2	LC		1	0	2	3
116	*P. draconis* Barnard, 1937	LC		2	0	2	4	LC		2	0	2	4
117	*P. furcigerum* (Rambur, 1842)	NT		3	1	3	7	LC		2	0	1	3
118	*P. gamblesi* Pinhey, 1978	LC		2	0	2	4	LC		1	0	1	2
119	*P. hageni* Karsch, 1893	LC		0	0	2	2	LC		1	0	1	2
120	*P. hamoni* Fraser, 1955	LC		1	0	1	2	LC		0	0	1	1
121	*P. inopinatum* Balinsky, 1971	NT		3	1	3	7	NT		3	1	1	5
122	*P. kersteni* (Gerstäcker, 1869)	LC		0	0	1	1	LC		0	0	1	1
123	*P. makabusiense* Pinhey, 1950	VU	B1ab(i,ii,iii,iv)	2	1	2	5	LC		2	0	1	3
124	*P. massaicum* Sjöstedt, 1909	LC		0	0	1	1	LC		1	0	2	3
125	*P. newtoni* Pinhey, 1962	VU	D2	3	2	3	8	VU	D2	3	2	2	7
126	*P. salisburyense* Ris, 1921	LC		0	0	1	1	LC		1	0	1	2
127	*P. sjoestedti* Förster, 1906	VU	D2	2	1	3	6	LC		0	0	1	1
128	*P. spernatum* Sélys, 1881	LC		1	0	2	3	LC		1	0	1	2
129	*P. sublacteum* (Karsch, 1893)	LC		1	0	1	2	LC		0	0	1	1
130	*P. sudanicum* Le Roi, 1915	LC		2	0	2	4	LC		1	0	1	2
131	*P. vaalense* Chutter, 1962	LC		3	0	2	5	LC		2	0	1	3
132	*Rhyothemis semihyalina* (Desjardins, 1832)	LC		1	0	0	1	LC		0	0	1	1

APPENDIX B1: (*continued*)

Species No.	Species	National Red List		DBI				Global Red List		ADBI			
		Category	Criteria	1	2	3	Score	Category	Criteria	1	2	3	Score
133	*Spesbona angusta* (Sélys, 1863)	EN	A2c; B1ab(i,ii,iii) + 2ab(i,ii,iii); D2	3	3	3	9	EN	D2; B2ab(ii)	3	3	2	8
134	*Sympetrum fonscolombii* (Sélys, 1840)	LC		0	0	0	0	LC		0	0	0	0
135	*Syncordulia gracilis* (Burmeister, 1839)	VU	B2ab(i,ii,iii); D2	1	2	3	6	VU	B2ab(i,ii,iii); D2	2	2	2	6
136	*S. legator* Dijkstra, Samways & Simaika, 2007	VU	B2ab(i,ii,iii); D2	3	2	3	8	VU	B2ab(iii)	3	2	2	7
137	*S. serendipator* Dijkstra, Samways & Simaika, 2007	VU	B2ab(i,ii,iii); D2	3	2	3	8	VU	B2ab(iii)	3	2	2	7
138	*S. venator* (Barnard, 1933)	VU	B2ab(i,ii,iii); D2	3	2	2	7	VU	B2ab(i,ii,iii)	2	2	2	6
139	*Tetrathemis polleni* (Sélys, 1869)	LC		2	0	1	3	LC		0	0	1	1
140	*Tholymis tillarga* (Fabricius, 1798)	LC		2	0	1	3	LC		0	0	0	0
141	*Tramea basilaris* (Palisot de Beauvois, 1817)	LC		0	0	0	0	LC		0	0	0	0
142	*T. limbata* (Desjardins, 1832)	LC		0	0	0	0	LC		0	0	0	0
143	*Trithemis aconita* Lieftinck, 1969	LC		2	0	2	4	LC		0	0	0	0
144	*T. annulata* (Palisot de Beauvois, 1807)	LC		1	0	0	1	LC		0	0	0	0
145	*T. arteriosa* (Burmeister, 1839)	LC		0	0	0	0	LC		0	0	0	0
146	*T. donaldsoni* (Calvert, 1899)	LC		2	0	2	4	LC		1	0	2	3
147	*T. dorsalis* (Rambur, 1842)	LC		0	0	0	0	LC		1	0	2	3

APPENDIX B1: (*continued*)

Species No.	Species	National Red List		DBI				Global Red List		ADBI			
		Category	Criteria	1	2	3	Score	Category	Criteria	1	2	3	Score
148	*Trithemis furva* Karsch, 1899	LC		0	0	0	0	LC		1	0	1	2
149	*T. hecate* Ris, 1912	LC		2	0	2	4	LC		0	0	1	1
150	*T. kirbyi* Sélys, 1891	LC		0	0	0	0	LC		0	0	0	0
151	*T. pluvialis* Förster, 1906	LC		1	0	1	2	LC		1	0	1	2
152	*T. stictica* (Burmeister, 1839)	LC		0	0	1	1	LC		0	0	0	0
153	*T. werneri* Ris, 1912	NT		2	1	3	6	LC		1	0	1	2
154	*Urothemis assignata* (Sélys, 1872)	LC		1	0	2	3	LC		0	0	0	0
155	*U. edwardsii* (Sélys, 1849)	LC		1	0	1	2	LC		0	0	0	0
156	*U. luciana* Balinsky, 1961	LC		3	0	2	5	LC		2	0	1	3
157	*Zosteraeschna minuscula* (McLachlan, 1896)	LC		2	0	3	5	LC		2	0	2	4
158	*Z. usambarica* (Förster, 1906)	VU	B1ab(ii,iii) + 2ab(ii,iii)	2	1	2	5	LC		2	0	2	4
159	*Zygonoides fuelleborni* Grünberg, 1902	LC		2	0	2	4	LC		1	0	1	2
160	*Zygonyx natalensis* (Martin, 1900)	LC		0	0	2	2	LC		1	0	1	2
161	*Z. torridus* (Kirby, 1889)	LC		1	0	1	2	LC		0	0	1	1
162	*Zyxomma atlanticum* Sélys, 1889	LC		2	0	3	5	LC		1	0	2	3

APPENDIX B2: Species lists presenting the differences between the three South African DBI and ADBI sub-index scores.

Exhibiting the differences between the sub-index scores (0 to 3) of the three sub-indices for the South Africa Dragonfly Biotic Index (DBI) and the African Dragonfly Biotic Index (ADBI). These differences are presented as various species lists according to five groups, i.e. group 1 (distribution – lower ADBI scores); group 2 (distribution – higher ADBI scores); group 3 (threat status – lower ADBI scores); group 4 (sensitivity/vulnerability – lower ADBI scores); and group 5 (sensitivity/vulnerability – higher ADBI scores). Each of these groups is further sub-divided according to the differences between the DBI and ADBI sub-scores.

Group 1: Distribution (lower ADBI scores)

A: DBI sub-index 1 = 1 vs ADBI sub-index 1 = 0 (30 species)

Species no.	Species	Species no.	Species
3	*Acisoma inflatum*	82	*Orthetrum julia* (northern form)
17	*Anax ephippiger*	88	*Orthetrum trinacria*
22	*Brachythemis lacustris*	90	*Palpopleura jucunda*
23	*Brachythemis leucosticta*	91	*Palpopleura lucia*
42	*Crocothemis sanguinolenta*	92	*Palpopleura portia*
43	*Diplacodes lefebvrii*	96	*Paragomphus genei*
44	*Diplacodes luminans*	100	*Phaon iridipennis*
51	*Gynacantha manderica*	102	*Phyllomacromia contumax*
55	*Hemistigma albipunctum*	120	*Pseudagrion hamoni*
56	*Ictinogomphus ferox*	129	*Pseudagrion sublacteum*
60	*Lestes pallidus*	132	*Rhyothemis semihyalina*
75	*Orthetrum abbotti*	144	*Trithemis annulata*
78	*Orthetrum chrysostigma*	154	*Urothemis assignata*
80	*Orthetrum hintzi*	155	*Urothemis edwardsii*
81	*Orthetrum icteromelas*	161	*Zygonyx torridus*

B: DBI sub-index 1 = 2 vs ADBI sub-index 1 = 0 (22 species)

Species no.	Species	Species no.	Species
5	*Aethriamanta rezia*	58	*Lestes dissimulans*
10	*Agriocnemis exilis*	59	*Lestes ictericus*
20	*Anax tristis*	62	*Lestes tridens*
29	*Chalcostephia flavifrons*	67	*Mesocnemis singularis*
40	*Crocothemis divisa*	73	*Olpogastra lugubris*

B: (*continued*)

Species no.	Species	Species no.	Species
76	*Orthetrum brachiale*	99	*Parazyxomma flavicans*
79	*Orthetrum guineense*	127	*Pseudagrion sjoestedti*
83	*Orthetrum machadoi*	139	*Tetrathemis polleni*
84	*Orthetrum monardi*	140	*Tholymis tillarga*
87	*Orthetrum stemmale*	143	*Trithemis aconita*
89	*Palpopleura deceptor*	149	*Trithemis hecate*

C: DBI sub-index 1 = 2 vs ADBI sub-index 1 = 1 (25 species)

Species no.	Species	Species no.	Species
2	*Aciagrion gracile*	98	*Paragomphus sabicus*
12	*Agriocnemis gratiosa*	101	*Phyllogomphus selysi*
16	*Anaciaeschna triangulifera*	103	*Phyllomacromia monoceros*
24	*Bradinopyga cornuta*	110	*Pseudagrion acaciae*
50	*Gomphidia quarrei*	111	*Pseudagrion assegaii*
52	*Gynacantha usambarica*	114	*Pseudagrion coeleste* (northern form)
53	*Gynacantha villosa*	118	*Pseudagrion gamblesi*
54	*Hemicordulia africana*	130	*Pseudagrion sudanicum*
63	*Lestes uncifer*	146	*Trithemis donaldsoni*
65	*Lestinogomphus angustus*	153	*Trithemis werneri*
66	*Macrodiplax cora*	159	*Zygonoides fuelleborni*
71	*Notiothemis jonesi*	162	*Zyxomma atlanticum*
95	*Paragomphus elpidius*		

D: DBI sub-index 1 = 3 vs ADBI sub-index 1 = 2 (11 species)

Species no.	Species	Species no.	Species
11	*Agriocnemis falcifera*	48	*Elattoneura frenulata*
14	*Agriocnemis ruberrima*	117	*Pseudagrion furcigerum*
26	*Ceratogomphus triceraticus*	131	*Pseudagrion vaalense*
32	*Chlorolestes conspicuus*	138	*Syncordulia venator*
34	*Chlorolestes elegans*	156	*Urothemis luciana*
37	*Chlorolestes umbratus*		

E: DBI sub-index 1 = 3 vs ADBI sub-index 1 = 1 (1 species)

Species number: 30

Species: *Chlorocypha consueta*

F: DBI sub-index 1 = 3 vs ADBI sub-index 1 = 0 (1 species)

Species number: 28

Species: *Ceriagrion suave*

Group 2: Distribution (higher ADBI scores)

A: DBI sub-index 1 = 0 vs ADBI sub-index 1 = 1 (10 species)

Species no.	Species	Species no.	Species
7	*Africallagma glaucum*	124	*Pseudagrion massaicum*
19	*Anax speratus*	126	*Pseudagrion salisburyense*
49	*Elattoneura glauca*	147	*Trithemis dorsalis*
94	*Paragomphus cognatus*	148	*Trithemis furva*
119	*Pseudagrion hageni*	160	*Zygonyx natalensis*

B: DBI sub-index 1 = 0 vs ADBI sub-index 1 = 2 (1 species)

Species number: 25

Species: *Ceratogomphus pictus*

C: DBI sub-index 1 = 1 vs ADBI sub-index 1 = 2 (2 species)

Species no.	Species	Species no.	Species
13	*Agriocnemis pinheyi*	135	*Syncordulia gracilis*

Group 3: Threat status (lower ADBI scores)

A: DBI sub-index 2 = 1 vs ADBI sub-index 2 = 0 (23 species)

Species no.	Species	Species no.	Species
1	*Aciagrion dondoense*	52	*Gynacantha usambarica*
2	*Aciagrion gracile*	53	*Gynacantha villosa*
12	*Agriocnemis gratiosa*	54	*Hemicordulia africana*
38	*Crenigomphus cornutus*	58	*Lestes dissimulans*
50	*Gomphidia quarrei*	59	*Lestes ictericus*

A: (*continued*)

Species no.	Species	Species no.	Species
63	*Lestes uncifer*	111	*Pseudagrion assegaii*
65	*Lestinogomphus angustus*	117	*Pseudagrion furcigerum*
70	*Neurogomphus zambeziensis*	123	*Pseudagrion makabusiense*
73	*Olpogastra lugubris*	127	*Pseudagrion sjoestedti*
85	*Orthetrum robustum*	153	*Trithemis werneri*
99	*Parazyxomma flavicans*	158	*Zosteraeschna usambarica*
103	*Phyllomacromia monoceros*		

B: DBI sub-index 2 = 2 vs ADBI sub-index 2 = 0 (4 species)

Species no.	Species	Species no.	Species
14	*Agriocnemis ruberrima*	30	*Chlorocypha consueta*
28	*Ceriagrion suave*	45	*Diplacodes pumila*

Group 4: Sensitivity/Vulnerability (lower ADBI scores)

A: DBI sub-index 3 = 1 vs ADBI sub-index 3 = 0 (11 species)

Species no.	Species	Species no.	Species
3	*Acisoma inflatum*	100	*Phaon iridipennis*
62	*Lestes tridens*	102	*Phyllomacromia contumax*
67	*Mesocnemis singularis*	140	*Tholymis tillarga*
90	*Palpopleura jucunda*	152	*Trithemis stictica*
91	*Palpopleura lucia*	155	*Urothemis edwardsii*
92	*Palpopleura portia*		

B: DBI sub-index 3 = 2 vs ADBI sub-index 3 = 0 (7 species)

Species no.	Species	Species no.	Species
16	*Anaciaeschna triangulifera*	89	*Palpopleura deceptor*
24	*Diplacodes luminans*	143	*Trithemis aconita*
55	*Hemistigma albipunctum*	154	*Urothemis assignata*
58	*Lestes dissimulans*		

C: DBI sub-index 3 = 2 vs ADBI sub-index 3 = 1 (41 species)

Species no.	Species	Species no.	Species
1	*Aciagrion dondoense*	84	*Orthetrum monardi*
5	*Aethriamanta rezia*	85	*Orthetrum robustum*
8	*Africallagma sapphirinum*	87	*Orthetrum stemmale*
10	*Agriocnemis exilis*	95	*Paragomphus elpidius*
12	*Agriocnemis gratiosa*	96	*Paragomphus genei*
19	*Anax speratus*	97	*Paragomphus magnus*
20	*Anax tristis*	98	*Paragomphus sabicus*
21	*Azuragrion nigridorsum*	101	*Phyllogomphus selysi*
22	*Brachythemis lacustris*	107	*Platycypha caligata*
25	*Ceratogomphus pictus*	114	*Pseudagrion coeleste* (northern form)
28	*Ceriagrion suave*	118	*Pseudagrion gamblesi*
29	*Chalcostephia flavifrons*	119	*Pseudagrion hageni*
30	*Chlorocypha consueta*	123	*Pseudagrion makabusiense*
38	*Crenigomphus cornutus*	128	*Pseudagrion spernatum*
39	*Crenigomphus hartmanni*	130	*Pseudagrion sudanicum*
42	*Crocothemis sanguinolenta*	131	*Pseudagrion vaalense*
43	*Diplacodes lefebvrii*	149	*Trithemis hecate*
63	*Lestes uncifer*	156	*Urothemis luciana*
65	*Lestinogomphus angustus*	159	*Zygonoides fuelleborni*
79	*Orthetrum guineense*	160	*Zygonyx natalensis*
80	*Orthetrum hintzi*		

D: DBI sub-index 3 = 3 vs ADBI sub-index 3 = 1 (15 species)

Species no.	Species	Species no.	Species
2	*Aciagrion gracile*	72	*Notogomphus praetorius*
24	*Bradinopyga cornuta*	74	*Onychogomphus supinus*
26	*Ceratogomphus triceraticus*	99	*Parazyxomma flavicans*
45	*Diplacodes pumila*	117	*Pseudagrion furcigerum*
50	*Gomphidia quarrei*	121	*Pseudagrion inopinatum*
51	*Gynacantha manderica*	127	*Pseudagrion sjoestedti*
59	*Lestes ictericus*	153	*Trithemis werneri*
70	*Neurogomphus zambeziensis*		

E: DBI sub-index 3 = 3 vs ADBI sub-index 3 = 2 (18 species)

Species no.	Species	Species no.	Species
9	*Africallagma sinuatum*	108	*Proischnura polychromatica*
14	*Agriocnemis ruberrima*	112	*Pseudagrion caffrum*
31	*Chlorolestes apricans*	125	*Pseudagrion newtoni*
32	*Chlorolestes conspicuus*	133	*Spesbona angusta*
33	*Chlorolestes draconicus*	135	*Syncordulia gracilis*
47	*Ecchlorolestes peringueyi*	136	*Syncordulia legator*
52	*Gynacantha usambarica*	137	*Syncordulia serendipator*
53	*Gynacantha villosa*	157	*Zosteraeschna minuscula*
86	*Orthetrum rubens*	162	*Zyxomma atlanticum*

Group 5: Sensitivity/Vulnerability (higher ADBI scores)

A: DBI sub-index 3 = 0 vs ADBI sub-index 3 = 1 (8 species)

Species no.	Species	Species no.	Species
40	*Crocothemis divisa*	88	*Orthetrum trinacria*
41	*Crocothemis erythraea*	93	*Pantala flavescens*
57	*Ischnura senegalensis*	132	*Rhyothemis semihyalina*
82	*Orthetrum julia* (northern form)	148	*Trithemis furva*

B: DBI sub-index 3 = 1 vs ADBI sub-index 3 = 2 (6 species)

Species no.	Species	Species no.	Species
4	*Acisoma variegatum*	113	*Pseudagrion citricola*
7	*Africallagma glaucum*	115	*Pseudagrion commoniae*
71	*Notiothemis jonesi*	124	*Pseudagrion massaicum*

C: DBI sub-index 3 = 0 vs ADBI sub-index 3 = 2 (1 species)

Species number: 147

Species: *Trithemis dorsalis*

D: DBI sub-index 3 = 2 vs ADBI sub-index 3 = 3 (1 species)

Species number: 103

Species: *Phyllomacromia monoceros*

APPENDIX B3: Species lists presenting the differences between the ecology of the South African DBI and ADBI.

Species lists displaying the difference in the ecology of the South African dragonflies between the South African Dragonfly Biotic Index (DBI) and the African Dragonfly Biotic Index (ADBI). The ecology of the species is indicated by the totality of the sub-indices 1 and 3 of the two indices (i.e. DBI 1 and ADBI 1: distribution; DBI 3: habitat sensitivity; and ADBI 3: species vulnerability). The differences are presented as various species lists according to three groups, i.e. group 1 (sub-indices 1 and 3 – lower ADBI ecology scores); group 2 (sub-indices 1 and 3 – higher ADBI ecology scores); and group 3 (sub-indices 1 and 3 – DBI = ADBI). Each of these groups is further sub-divided according to the sub-scores that have a difference between the DBI and ADBI ecology scores. Included in the lists, are the sub-scores of the sub-indices 1 and 3 (DBI 1,3: ADBI 1,3) as well as the IUCN/SSC Red List (RL) threat statuses. IUCN/SSC threat status abbreviations used (IUCN 2016): LC – Least Concern, NT – Near Threatened, VU – Vulnerable, EN – Endangered and CR – Critically Endangered.

Group 1: Sub-indices 1 and 3 (lower ADBI ecology scores)

A: DBI = 1 vs ADBI = 0 (2 species)

Spp. no.	Species	1,3	RL	Spp. no.	Species	1,3	RL
144	*Trithemis annulata*	1,0:0,0	LC	152	*Trithemis stictica*	0,1:0,0	LC

B: DBI = 2 vs ADBI = 0 (8 species)

Spp. no.	Species	1,3	RL	Spp. no.	Species	1,3	RL
3	*Acisoma inflatum*	1,1:0,0	LC	92	*Palpopleura portia*	1,1:0,0	LC
76	*Orthetrum brachiale*	2,0:0,0	LC	100	*Phaon iridipennis*	1,1:0,0	LC
90	*Palpopleura jucunda*	1,1:0,0	LC	102	*Phyllomacromia contumax*	1,1:0,0	LC
91	*Palpopleura lucia*	1,1:0,0	LC	155	*Urothemis edwardsii*	1,1:0,0	LC

C: DBI = 2 vs ADBI = 1 (11 species)

Spp. no.	Species	1,3	RL	Spp. no.	Species	1,3	RL
17	*Anax ephippiger*	1,1:0,1	LC	78	*Orthetrum chrysostigma*	1,1:0,1	LC
23	*Brachythemis leucosticta*	1,1:0,1	LC	81	*Orthetrum icteromelas*	1,1:0,1	LC
40	*Crocothemis divisa*	2,0:0,1	LC	120	*Pseudagrion hamoni*	1,1:0,1	LC
56	*Ictinogomphus ferox*	1,1:0,1	LC	129	*Pseudagrion sublacteum*	1,1:0,1	LC
60	*Lestes pallidus*	1,1:0,1	LC	161	*Zygonyx torridus*	1,1:0,1	LC
75	*Orthetrum abbotti*	1,1:0,1	LC				

D: DBI = 3 vs ADBI = 0 (6 species)

Spp. no.	Species	1,3	RL	Spp. no.	Species	1,3	RL
44	*Diplacodes luminans*	1,2:0,0	LC	67	*Mesocnemis singularis*	2,1:0,0	LC
55	*Hemistigma albipunctum*	1,2:0,0	LC	140	*Tholymis tillarga*	2,1:0,0	LC
62	*Lestes tridens*	2,1:0,0	LC	154	*Urothemis assignata*	1,2:0,0	LC

E: DBI = 3 vs ADBI = 1 (8 species)

Spp. no.	Species	1,3	RL	Spp. no.	Species	1,3	RL
22	*Brachythemis lacustris*	1,2:0,1	LC	80	*Orthetrum hintzi*	1,2:0,1	LC
42	*Crocothemis sanguinolenta*	1,2:0,1	LC	83	*Orthetrum machadoi*	2,1:0,1	LC
43	*Diplacodes lefebvrii*	1,2:0,1	LC	96	*Paragomphus genei*	1,2:0,1	LC
73	*Olpogastra lugubris*	2,1:0,1	NT*	139	*Tetrathemis polleni*	2,1:0,1	LC

*National status is the highest threat status.

F: DBI = 3 vs ADBI = 2 (4 species)

Spp. no.	Species	1,3	RL	Spp. no.	Species	1,3	RL
21	*Azuragrion nigridorsum*	1,2:1,1	LC	110	*Pseudagrion acaciae*	2,1:1,1	LC
39	*Crenigomphus hartmanni*	1,2:1,1	LC	128	*Pseudagrion spernatum*	1,2:1,1	LC

G: DBI = 4 vs ADBI = 0 (3 species)

Spp. no.	Species	1,3	RL	Spp. no.	Species	1,3	RL
58	*Lestes dissimulans*	2,2:0,0	VU*	143	*Trithemis aconita*	2,2:0,0	LC
89	*Palpopleura deceptor*	2,2:0,0	LC				

*National status is the highest threat status.

H: DBI = 4 vs ADBI = 1 (10 species)

Spp. no.	Species	1,3	RL	Spp. no.	Species	1,3	RL
5	*Aethriamanta rezia*	2,2:0,1	LC	51	*Gynacantha manderica*	1,3:0,1	LC
10	*Agriocnemis exilis*	2,2:0,1	LC	79	*Orthetrum guineense*	2,2:0,1	LC
16	*Anaciaeschna triangulifera*	2,2:1,0	LC	84	*Orthetrum monardi*	2,2:0,1	LC
20	*Anax tristis*	2,2:0,1	LC	87	*Orthetrum stemmale*	2,2:0,1	LC
29	*Chalcostephia flavifrons*	2,2:0,1	LC	149	*Trithemis hecate*	2,2:0,1	LC

I: DBI = 4 vs ADBI = 2 (11 species)

Spp. no.	Species	1,3	RL	Spp. no.	Species	1,3	RL
12	*Agriocnemis gratiosa*	2,2:1,1	VU*	101	*Phyllogomphus selysi*	2,2:1,1	LC
63	*Lestes uncifer*	2,2:1,1	VU*	114	*Pseudagrion coeleste*	2,2:1,1	LC
65	*Lestinogomphus angustus*	2,2:1,1	NS*	118	*Pseudagrion gamblesi*	2,2:1,1	LC
72	*Notogomphus praetorius*	1,3:1,1	LC	130	*Pseudagrion sudanicum*	2,2:1,1	LC
95	*Paragomphus elpidius*	2,2:1,1	LC	159	*Zygonoides fuelleborni*	2,2:1,1	LC
98	*Paragomphus sabicus*	2,2:1,1	LC				

*National status is the highest threat status.

J: DBI = 4 vs ADBI = 3 (12 species)

Spp. no.	Species	1,3	RL	Spp. no.	Species	1,3	RL
1	*Aciagrion dondoense*	2,2:2,1	VU*	85	*Orthetrum robustum*	2,2:2,1	NT*
8	*Africallagma sapphirinum*	2,2:2,1	LC	97	*Paragomphus magnus*	2,2:2,1	LC
11	*Agriocnemis falcifera*	3,1:2,1	LC	107	*Platycypha fitzsimonsi*	2,2:2,1	LC
38	*Crenigomphus cornutus*	2,2:2,1	VU*	111	*Pseudagrion assegaii*	2,2:1,2	VU*
54	*Hemicordulia africana*	2,2:1,2	NT*	123	*Pseudagrion makabusiense*	2,2:2,1	VU*
66	*Macrodiplax cora*	2,2:1,2	LC	146	*Trithemis donaldsoni*	2,2:1,2	LC

*National status is the highest threat status.

K: DBI = 5 vs ADBI = 1 (4 species)

Spp. no.	Species	1,3	RL	Spp. no.	Species	1,3	RL
28	*Ceriagrion suave*	3,2:0,1	EN*	99	*Parazyxomma flavicans*	2,3:0,1	VU*
59	*Lestes ictericus*	2,3:0,1	VU*	127	*Pseudagrion sjoestedti*	2,3:0,1	VU*

*National status is the highest threat status.

L: DBI = 5 vs ADBI = 2 (5 species)

Spp. no.	Species	1,3	RL	Spp. no.	Species	1,3	RL
2	*Aciagrion gracile*	2,3:1,1	VU*	50	*Gomphidia quarrei*	2,3:1,1	VU*
24	*Bradinopyga cornuta*	2,3:1,1	LC	153	*Trithemis werneri*	2,3:1,1	NT*
30	*Chlorocypha consueta*	3,2:1,1	CR*				

*National status is the highest threat status.

M: DBI = 5 vs ADBI = 3 (8 species)

Spp. no.	Species	1,3	RL	Spp. no.	Species	1,3	RL
45	*Diplacodes pumila*	2,3:2,1	EN*	74	*Onychogomphus supinus*	2,3:2,1	LC
52	*Gynacantha usambarica*	2,3:1,2	VU*	131	*Pseudagrion vaalense*	3,2:2,1	LC
53	*Gynacantha villosa*	2,3:1,2	VU*	156	*Urothemis luciana*	3,2:2,1	LC
70	*Neurogomphus zambeziensis*	2,3:2,1	VU*	162	*Zyxomma atlanticum*	2,3:1,2	LC

*National status is the highest threat status.

N: DBI = 5 vs ADBI = 4 (7 species)

Spp. no.	Species	1,3	RL	Spp. no.	Species	1,3	RL
9	*Africallagma sinuatum*	2,3:2,2	LC	112	*Pseudagrion caffrum*	2,3:2,2	LC
34	*Chlorolestes elegans*	3,2:2,2	VU*	138	*Syncordulia venator*	3,2:2,2	VU§
37	*Chlorolestes umbratus*	3,2:2,2	LC	157	*Zosteraeschna minuscula*	2,3:2,2	LC
48	*Elattoneura frenulata*	3,2:2,2	LC				

*National status is the highest threat status. Also, this particular species' global status is NT.

§Global status is the highest threat status.

O: DBI = 6 vs ADBI = 3 (2 species)

Spp. no.	Species	1,3	RL	Spp. no.	Species	1,3	RL
26	*Ceratogomphus triceraticus*	3,3:2,1	NT§	117	*Pseudagrion furcigerum*	3,3:2,1	NT*

*National status is the highest threat status.

§Global status is the highest threat status.

P: DBI = 6 vs ADBI = 4 (3 species)

Spp. no.	Species	1,3	RL	Spp. no.	Species	1,3	RL
14	*Agriocnemis ruberrima*	3,3:2,2	EN*	121	*Pseudagrion inopinatum*	3,3:3,1	NT§
32	*Chlorolestes conspicuus*	3,3:2,2	LC				

*National status is the highest threat status.

§Global status is the highest threat status.

Q: DBI = 6 vs ADBI = 5 (9 species)

Spp. no.	Species	1,3	RL	Spp. no.	Species	1,3	RL
31	*Chlorolestes apricans*	3,3:3,2	EN§	125	*Pseudagrion newtoni*	3,3:3,2	VU§
33	*Chlorolestes draconicus*	3,3:3,2	LC	133	*Spesbona angusta*	3,3:3,2	EN§
47	*Ecchlorolestes peringueyi*	3,3:3,2	NT§	136	*Syncordulia legator*	3,3:3,2	VU§
86	*Orthetrum rubens*	3,3:3,2	EN§	137	*Syncordulia serendipator*	3,3:3,2	VU§
108	*Proischnura polychromatica*	3,3:3,2	EN§				

§Global status is the highest threat status.

Group 2: Sub-indices 1 and 3 (higher ADBI ecology scores)

A: DBI = 0 vs ADBI = 1 (3 species)

Spp. no.	Species	1,3	RL	Spp. no.	Species	1,3	RL
41	*Crocothemis erythraea*	0,0:0,1	LC	93	*Pantala flavescens*	0,0:0,1	LC
57	*Ischnura senegalensis*	0,0:0,1	LC				

B: DBI = 0 vs ADBI = 2 (1 species)

Spp. no.	Species	1,3	RL
148	*Trithemis furva*	0,0:1,1	LC

C: DBI = 0 vs ADBI = 3 (1 species)

Spp. no.	Species	1,3	RL
147	*Trithemis dorsalis*	0,0:1,2	LC

D: DBI = 1 vs ADBI = 2 (3 species)

Spp. no.	Species	1,3	RL	Spp. no.	Species	1,3	RL
49	*Elattoneura glauca*	0,1:1,1	LC	126	*Pseudagrion salisburyense*	0,1:1,1	LC
94	*Paragomphus cognatus*	0,1:1,1	LC				

E: DBI = 1 vs ADBI = 3 (2 species)

Spp. no.	Species	1,3	RL	Spp. no.	Species	1,3	RL
7	*Africallagma glaucum*	0,1:1,2	LC	124	*Pseudagrion massaicum*	0,1:1,2	LC

F: DBI = 2 vs ADBI = 3 (4 species)

Spp. no.	Species	1,3	RL	Spp. no.	Species	1,3	RL
4	*Acisoma variegatum*	1,1:1,2	LC	25	*Ceratogomphus pictus*	0,2:2,1	LC
13	*Agriocnemis pinheyi*	1,1:2,1	LC	115	*Pseudagrion commoniae*	1,1:1,2	LC

G: DBI = 3 vs ADBI = 4 (1 species)

Spp. no.	Species	1,3	RL
113	*Pseudagrion citricola*	2,1:2,2	LC

Group 3: Sub-indices 1 and 3 (DBI = ADBI)

A: DBI = 0 vs ADBI = 0 (6 species)

Spp. no.	Species	1,3	RL	Spp. no.	Species	1,3	RL
27	*Ceriagrion glabrum*	0,0:0,0	LC	142	*Tramea limbata*	0,0:0,0	LC
134	*Sympetrum fonscolombii*	0,0:0,0	LC	145	*Trithemis arteriosa*	0,0:0,0	LC
141	*Tramea basilaris*	0,0:0,0	LC	150	*Trithemis kirbyi*	0,0:0,0	LC

B: DBI = 1 vs ADBI = 1 (6 species)

Spp. no.	Species	1,3	RL	Spp. no.	Species	1,3	RL
18	*Anax imperator*	0,1:0,1	LC	88	*Orthetrum trinacria*	1,0:0,1	LC
69	*Nesciothemis farinosa*	0,1:0,1	LC	122	*Pseudagrion kersteni*	0,1:0,1	LC
82	*Orthetrum julia*	1,0:0,1	LC	132	*Rhyothemis semihyalina*	1,0:0,1	LC

C: DBI = 2 vs ADBI = 2 (8 species)

Spp. no.	Species	1,3	RL	Spp. no.	Species	1,3	RL
19	*Anax speratus*	0,2:1,1	LC	106	*Platycypha caligata*	1,1:1,1	LC
61	*Lestes plagiatus*	1,1:1,1	LC	119	*Pseudagrion hageni*	0,2:1,1	LC
64	*Lestes virgatus*	1,1:1,1	LC	151	*Trithemis pluvialis*	1,1:1,1	LC
104	*Phyllomacromia picta*	1,1:1,1	LC	160	*Zygonyx natalensis*	0,2:1,1	LC

D: DBI = 3 vs ADBI = 3 (2 species)

Spp. no.	Species	1,3	RL	Spp. no.	Species	1,3	RL
71	*Notiothemis jonesi*	2,1:1,2	LC	77	*Orthetrum caffrum*	1,2:1,2	LC

E: DBI = 4 vs ADBI = 4 (9 species)

Spp. no.	Species	1,3	RL	Spp. no.	Species	1,3	RL
6	*Africallagma fractum*	2,2:2,2	LC	109	*Proischnura rotundipennis*	2,2:2,2	LC
35	*Chlorolestes fasciatus*	2,2:2,2	LC	116	*Pseudagrion draconis*	2,2:2,2	LC
36	*Chlorolestes tessellatus*	2,2:2,2	LC	135	*Syncordulia gracilis*	1,3:2,2	VU[§]
103	*Phyllomacromia monoceros*	2,2:1,3	NT*	158	*Zosteraeschna usambarica*	2,2:2,2	VU*
105	*Pinheyschna subpupillata*	2,2:2,2	LC				

*National status is the highest threat status.

[§]Global status is the highest threat status.

F: DBI = 5 vs ADBI = 5 (1 species)

Spp. no.	Species	1,3	RL
15	*Allocnemis leucosticta*	2,3:2,3	LC

G: DBI = 6 vs ADBI = 6 (2 species)

Spp. no.	Species	1,3	RL	Spp. no.	Species	1,3	RL
46	*Ecchlorolestes nylephtha*	3,3:3,3	NT[§]	68	*Metacnemis valida*	3,3:3,3	EN[§]

[§]Global status is the highest threat status.

APPENDIX B4: Comparing the original South African DBI with the new ADBI scores.

The original South African Dragonfly Biotic Index (DBI) scores are compared with the new African Dragonfly Biotic Index (ADBI) scores, i.e. ADBI sub-indices 1 (distribution) and 2 (threat status) plus the third sub-index of the DBI (habitat sensitivity). In other words, ADBI sub-index 3 (species vulnerability) was replaced by DBI sub-index 3 (habitat sensitivity). The differences are presented as various species lists according to three groups, i.e. group 1 (lower new ADBI scores); group 2 (higher new ADBI scores); and group 3 (DBI = ADBI). Each of these groups is further sub-divided according to the sub-scores that have a difference between the original DBI scores and the new ADBI scores. Included, are the original ADBI scores as well as the IUCN/SSC Red List (RL) threat statuses. IUCN/SSC threat status abbreviations used (IUCN 2016): LC – Least Concern, NT – Near Threatened, VU – Vulnerable, EN – Endangered and CR – Critically Endangered.

Group 1: ADBI 1 and 2 plus DBI 3 (lower ADBI new scores)

A: DBI = 1 vs ADBI 1 and 2 plus DBI 3 = 0 (4 species)

Spp. no.	Species	ADBI	RL	Spp. no.	Species	ADBI	RL
82	*Orthetrum julia*	1	LC	132	*Rhyothemis semihyalina*	1	LC
88	*Orthetrum trinacria*	1	LC	144	*Trithemis annulata*	0	LC

B: DBI = 2 vs ADBI 1 and 2 plus DBI 3 = 0 (2 species)

Spp. no.	Species	ADBI	RL	Spp. no.	Species	ADBI	RL
40	*Crocothemis divisa*	1	LC	76	*Orthetrum brachiale*	0	LC

C: DBI = 2 vs ADBI 1 and 2 plus DBI 3 = 1 (17 species)

Spp. no.	Species	ADBI	RL	Spp. no.	Species	ADBI	RL
3	*Acisoma inflatum*	0	LC	91	*Palpopleura lucia*	0	LC
17	*Anax ephippiger*	1	LC	92	*Palpopleura portia*	0	LC
23	*Brachythemis leucosticta*	1	LC	100	*Phaon iridipennis*	0	LC
56	*Ictinogomphus ferox*	1	LC	102	*Phyllomacromia contumax*	0	LC
60	*Lestes pallidus*	1	LC	120	*Pseudagrion hamoni*	1	LC
75	*Orthetrum abbotti*	1	LC	129	*Pseudagrion sublacteum*	1	LC
78	*Orthetrum chrysostigma*	1	LC	155	*Urothemis edwardsii*	0	LC
81	*Orthetrum icteromelas*	1	LC	161	*Zygonyx torridus*	1	LC
90	*Palpopleura jucunda*	0	LC				

D: DBI = 3 vs ADBI 1 and 2 plus DBI 3 = 1 (5 species)

Spp. no.	Species	ADBI	RL	Spp. no.	Species	ADBI	RL
62	*Lestes tridens*	0	LC	139	*Tetrathemis polleni*	1	LC
67	*Mesocnemis singularis*	0	LC	140	*Tholymis tillarga*	0	LC
83	*Orthetrum machadoi*	1	LC				

E: DBI = 3 vs ADBI 1 and 2 plus DBI 3 = 2 (10 species)

Spp. no.	Species	ADBI	RL	Spp. no.	Species	ADBI	RL
22	*Brachythemis lacustris*	1	LC	71	*Notiothemis jonesi*	3	LC
42	*Crocothemis sanguinolenta*	1	LC	80	*Orthetrum hintzi*	1	LC
43	*Diplacodes lefebvrii*	1	LC	96	*Paragomphus genei*	1	LC
44	*Diplacodes luminans*	0	LC	110	*Pseudagrion acaciae*	2	LC
55	*Hemistigma albipunctum*	0	LC	154	*Urothemis assignata*	0	LC

F: DBI = 4 vs ADBI 1 and 2 plus DBI 3 = 1 (1 species)

Spp. no.	Species	ADBI	RL
73	*Olpogastra lugubris*	1	NT*

*National status is the highest threat status.

G: DBI = 4 vs ADBI 1 and 2 plus DBI 3 = 2 (10 species)

Spp. no.	Species	ADBI	RL	Spp. no.	Species	ADBI	RL
5	*Aethriamanta rezia*	1	LC	84	*Orthetrum monardi*	1	LC
10	*Agriocnemis exilis*	1	LC	87	*Orthetrum stemmale*	1	LC
20	*Anax tristis*	1	LC	89	*Palpopleura deceptor*	0	LC
29	*Chalcostephia flavifrons*	1	LC	143	*Trithemis aconita*	0	LC
79	*Orthetrum guineense*	1	LC	149	*Trithemis hecate*	1	LC

H: DBI = 4 vs ADBI 1 and 2 plus DBI 3 = 3 (12 species)

Spp. no.	Species	ADBI	RL	Spp. no.	Species	ADBI	RL
11	*Agriocnemis falcifera*	3	LC	101	*Phyllogomphus selysi*	2	LC
16	*Anaciaeschna triangulifera*	1	LC	114	*Pseudagrion coeleste*	2	LC
51	*Gynacantha manderica*	1	LC	118	*Pseudagrion gamblesi*	2	LC
66	*Macrodiplax cora*	3	LC	130	*Pseudagrion sudanicum*	2	LC
95	*Paragomphus elpidius*	2	LC	146	*Trithemis donaldsoni*	3	LC
98	*Paragomphus sabicus*	2	LC	159	*Zygonoides fuelleborni*	2	LC

I: DBI = 5 vs ADBI 1 and 2 plus DBI 3 = 2 (1 species)

Spp. no.	Species	ADBI	RL
58	*Lestes dissimulans*	0	VU*

*National status is the highest threat status.

J: DBI = 5 vs ADBI 1 and 2 plus DBI 3 = 3 (6 species)

Spp. no.	Species	ADBI	RL	Spp. no.	Species	ADBI	RL
12	*Agriocnemis gratiosa*	2	VU*	65	*Lestinogomphus angustus*	2	NT*
54	*Hemicordulia africana*	3	NT*	103	*Phyllomacromia monoceros*	4	NT*
63	*Lestes uncifer*	2	VU*	111	*Pseudagrion assegaii*	3	VU*

*National status is the highest threat status.

K: DBI = 5 vs ADBI 1 and 2 plus DBI 3 = 4 (11 species)

Spp. no.	Species	ADBI	RL	Spp. no.	Species	ADBI	RL
1	*Aciagrion dondoense*	3	VU*	123	*Pseudagrion makabusiense*	3	VU*
24	*Bradinopyga cornuta*	2	LC	131	*Pseudagrion vaalense*	3	LC
37	*Chlorolestes umbratus*	4	LC	156	*Urothemis luciana*	3	LC
38	*Crenigomphus cornutus*	3	VU*	158	*Zosteraeschna usambarica*	4	VU*
48	*Elattoneura frenulata*	4	LC	162	*Zyxomma atlanticum*	3	LC
85	*Orthetrum robustum*	3	NT*				

*National status is the highest threat status.

L: DBI = 6 vs ADBI 1 and 2 plus DBI 3 = 3 (3 species)

Spp. no.	Species	ADBI	RL	Spp. no.	Species	ADBI	RL
59	*Lestes ictericus*	1	VU*	127	*Pseudagrion sjoestedti*	1	VU*
99	*Parazyxomma flavicans*	1	VU*			1	

*National status is the highest threat status.

M: DBI = 6 vs ADBI 1 and 2 plus DBI 3 = 4 (5 species)

Spp. no.	Species	ADBI	RL	Spp. no.	Species	ADBI	RL
2	*Aciagrion gracile*	2	VU*	53	*Gynacantha villosa*	3	VU*
50	*Gomphidia quarrei*	2	VU*	153	*Trithemis werneri*	2	NT*
52	*Gynacantha usambarica*	3	VU*				

*National status is the highest threat status.

N: DBI = 6 vs ADBI 1 and 2 plus DBI 3 = 5 (3 species)

Spp. no.	Species	ADBI	RL	Spp. no.	Species	ADBI	RL
32	*Chlorolestes conspicuus*	4	LC	70	*Neurogomphus zambeziensis*	3	VU*
34	*Chlorolestes elegans*	5	VU*				

*National status is the highest threat status.

O: DBI = 7 vs ADBI 1 and 2 plus DBI 3 = 2 (1 species)

Spp. no.	Species	ADBI	RL
28	*Ceriagrion suave*	1	EN*

*National status is the highest threat status.

P: DBI = 7 vs ADBI 1 and 2 plus DBI 3 = 3 (1 species)

Spp. no.	Species	ADBI	RL
30	*Chlorocypha consueta*	2	CR*

*National status is the highest threat status.

Q: DBI = 7 vs ADBI 1 and 2 plus DBI 3 = 5 (2 species)

Spp. no.	Species	ADBI	RL	Spp. no.	Species	ADBI	RL
45	*Diplacodes pumila*	3	EN*	117	*Pseudagrion furcigerum*	3	NT*

*National status is the highest threat status.

R: DBI = 7 vs ADBI 1 and 2 plus DBI 3 = 6 (2 species)

Spp. no.	Species	ADBI	RL	Spp. no.	Species	ADBI	RL
26	*Ceratogomphus triceraticus*	4	NT*	138	*Syncordulia venator*	6	VU§

*National status is the highest threat status.

§Global status is the highest threat status.

S: DBI = 8 vs ADBI 1 and 2 plus DBI 3 = 5 (1 species)

Spp. no.	Species	ADBI	RL
14	*Agriocnemis ruberrima*	4	EN*

*National status is the highest threat status.

Group 2: ADBI 1 and 2 plus DBI 3 (higher new ADBI scores)

A: DBI = 0 vs ADBI 1 and 2 plus DBI 3 = 1 (2 species)

Spp. no.	Species	ADBI	RL	Spp. no.	Species	ADBI	RL
147	*Trithemis dorsalis*	3	LC	148	*Trithemis furva*	2	LC

B: DBI = 1 vs ADBI 1 and 2 plus DBI 3 = 2 (5 species)

Spp. no.	Species	ADBI	RL	Spp. no.	Species	ADBI	RL
7	*Africallagma glaucum*	3	LC	124	*Pseudagrion massaicum*	3	LC
49	*Elattoneura glauca*	2	LC	126	*Pseudagrion salisburyense*	2	LC
94	*Paragomphus cognatus*	2	LC				

C: DBI = 2 vs ADBI 1 and 2 plus DBI 3 = 3 (4 species)

Spp. no.	Species	ADBI	RL	Spp. no.	Species	ADBI	RL
13	*Agriocnemis pinheyi*	3	LC	119	*Pseudagrion hageni*	2	LC
19	*Anax speratus*	2	LC	160	*Zygonyx natalensis*	2	LC

D: DBI = 2 vs ADBI 1 and 2 plus DBI 3 = 4 (1 species)

Spp. no.	Species	ADBI	RL
25	*Ceratogomphus pictus*	3	LC

E: DBI = 6 vs ADBI 1 and 2 plus DBI 3 = 7 (1 species)

Spp. no.	Species	ADBI	RL
135	*Syncordulia gracilis*	6	VU[§]

[§]Global status is the highest threat status.

Group 3: ADBI 1 and 2 plus DBI 3 (DBI = ADBI)

A: DBI = 0 vs ADBI 1 and 2 plus DBI 3 = 0 (9 species)

Spp. no.	Species	ADBI	RL	Spp. no.	Species	ADBI	RL
27	*Ceriagrion glabrum*	0	LC	141	*Tramea basilaris*	0	LC
41	*Crocothemis erythraea*	1	LC	142	*Tramea limbata*	0	LC
57	*Ischnura senegalensis*	1	LC	145	*Trithemis arteriosa*	0	LC
93	*Pantala flavescens*	1	LC	150	*Trithemis kirbyi*	0	LC
134	*Sympetrum fonscolombii*	0	LC				

B: DBI = 1 vs ADBI 1 and 2 plus DBI 3 = 1 (4 species)

Spp. no.	Species	ADBI	RL	Spp. no.	Species	ADBI	RL
18	*Anax imperator*	1	LC	122	*Pseudagrion kersteni*	1	LC
69	*Nesciothemis farinosa*	1	LC	152	*Trithemis stictica*	0	LC

C: DBI = 2 vs ADBI 1 and 2 plus DBI 3 = 2 (7 species)

Spp. no.	Species	ADBI	RL	Spp. no.	Species	ADBI	RL
4	*Acisoma variegatum*	3	LC	106	*Platycypha caligata*	2	LC
61	*Lestes plagiatus*	2	LC	115	*Pseudagrion commoniae*	3	LC
64	*Lestes virgatus*	2	LC	151	*Trithemis pluvialis*	2	LC
104	*Phyllomacromia picta*	2	LC				

D: DBI = 3 vs ADBI 1 and 2 plus DBI 3 = 3 (5 species)

Spp. no.	Species	ADBI	RL	Spp. no.	Species	ADBI	RL
21	*Azuragrion nigridorsum*	2	LC	113	*Pseudagrion citricola*	4	LC
39	*Crenigomphus hartmanni*	2	LC	128	*Pseudagrion spernatum*	2	LC
77	*Orthetrum caffrum*	3	LC				

E: DBI = 4 vs ADBI 1 and 2 plus DBI 3 = 4 (10 species)

Spp. no.	Species	ADBI	RL	Spp. no.	Species	ADBI	RL
6	*Africallagma fractum*	4	LC	97	*Paragomphus magnus*	3	LC
8	*Africallagma sapphirinum*	3	LC	105	*Pinheyschna subpupillata*	4	LC
35	*Chlorolestes fasciatus*	4	LC	107	*Platycypha fitzsimonsi*	3	LC
36	*Chlorolestes tessellatus*	4	LC	109	*Proischnura rotundipennis*	4	LC
72	*Notogomphus praetorius*	2	LC	116	*Pseudagrion draconis*	4	LC

F: DBI = 5 vs ADBI 1 and 2 plus DBI 3 = 5 (5 species)

Spp. no.	Species	ADBI	RL	Spp. no.	Species	ADBI	RL
9	*Africallagma sinuatum*	4	LC	112	*Pseudagrion caffrum*	4	LC
15	*Allocnemis leucosticta*	5	LC	157	*Zosteraeschna minuscula*	4	LC
74	*Onychogomphus supinus*	3	LC				

G: DBI = 6 vs ADBI 1 and 2 plus DBI 3 = 6 (1 species)

Spp. no.	Species	ADBI	RL
33	*Chlorolestes draconicus*	5	LC

H: DBI = 7 vs ADBI 1 and 2 plus DBI 3 = 7 (3 species)

Spp. no.	Species	ADBI	RL	Spp. no.	Species	ADBI	RL
46	*Ecchlorolestes nylephtha*	7	NT§	121	*Pseudagrion inopinatum*	5	NT§
47	*Ecchlorolestes peringueyi*	6	NT§				

§Global status is the highest threat status.

I: DBI = 8 vs ADBI 1 and 2 plus DBI 3 = 8 (3 species)

Spp. no.	Species	ADBI	RL	Spp. no.	Species	ADBI	RL
125	*Pseudagrion newtoni*	7	VU§	137	*Syncordulia serendipator*	7	VU§
136	*Syncordulia legator*	7	VU§				

§Global status is the highest threat status.

J: DBI = 9 vs ADBI 1 and 2 plus DBI 3 = 9 (5 species)

Spp. no.	Species	ADBI	RL	Spp. no.	Species	ADBI	RL
31	*Chlorolestes apricans*	8	EN§	108	*Proischnura polychromatica*	8	EN§
69	*Metacnemis valida*	9	EN§	133	*Spesbona angusta*	8	EN§
86	*Orthetrum rubens*	8	EN§				

§Global status is the highest threat status.

CHAPTER 4

Prioritizing the African countries for their potential to develop individual national Dragonfly Biotic Indices

ABSTRACT

Determining the extent to which Africa's freshwater ecosystems are affected by negative anthropogenic disturbances, a biomonitoring tool, the African Dragonfly Biotic Index (ADBI), was created for the entire continent. The ADBI is based on similar principles as that of the original Dragonfly Biotic Index (DBI) developed in South Africa, i.e. to rapidly assess the conditions of water bodies in the country. The main aim of the ADBI is for conservation planning and actions that may preserve or restore both running and still freshwater ecosystems within Africa. However, any conservation planning is typically based on conservation-action units, which can be heavily influenced by the political boundaries of countries. As the ADBI is a continental-scale bioassessment method, it must be translated for specific use in the different countries. However, the spatial database that was created for Africa's dragonflies varies in quality and quantity for the various countries. Consequently, countries were categorized on their potential to develop national DBIs according to their respective national databases. This was done by determining the quality and quantity of the data coverage of each African country. It was found that of the 48 African countries (excluding South Africa, which already has a national DBI), there are 12 countries (the first quartile) that are on the threshold of being able to create their own national DBIs. On the other hand, there are also 12 countries (in the last quartile) that have insufficient data and are not currently able to develop their own national DBIs. The two central quartiles of 24 countries have opportunities to develop their own DBIs following the gathering of more basic data.

Abbreviations used: ADBI – African Dragonfly Biotic Index; ADHM – African Dragonfly Habitat Matrix; DBI – Dragonfly Biotic Index (South Africa); IUCN/SSC – International Union for the Conservation of Nature/Species Survival Commission; ODA – Odonata Database of Africa.

1. INTRODUCTION

The freshwater ecosystems of Africa support a high diversity of aquatic organisms, which provide various services that are necessary for the survival of both the environment and people (Shumway 1999; Darwall *et al.* 2011). Yet the biodiversity of these freshwater ecosystems are progressively being impacted by negative anthropogenic disturbances, which are endangering the survival of both aquatic species and livelihoods (i.e. Shumway 1999; UNEP 2002; Revenga *et al.* 2005; Dudgeon *et al.* 2006; Strayer & Dudgeon 2010; Vörösmarty *et al.* 2010; Darwall *et al.* 2011). This has led to some urgency regarding the conservation of freshwater habitats and their species diversity across the continent.

However, at present there are no effective and practical aquatic biodiversity assessment tools that can measure the effects of adverse anthropogenic impacts on these ecosystems, or their recovery in the case of restoration. Also, until now, the necessary data available on the various aquatic taxa (e.g. fish, molluscs, plants and insects) found in the African freshwaters were largely lacking, making the creation of possible measuring tools more difficult. However, over a number of years, data have been collected and collated on several aquatic groups (Darwall *et al.* 2011). These databases are a starting point for the development of assessment tools, by using the species in these aquatic groups as potential indicators for assessing anthropogenic disturbances on the freshwater ecosystems of Africa.

The Odonata (dragonflies and damselflies) is one such taxonomic group that can be used for bioindication (e.g. Clark & Samways 1996; Foote & Hornung 2005; Smith *et al.* 2007; Oertli 2008; De Olieveira-Junior *et al.* 2015), and for which there are now numerous records on the African species (Dijkstra *et al.* 2011; Dijkstra & Clausnitzer 2014). Overall, dragonflies are widely recognized as good indicators of water condition, i.e. health and integrity (e.g. Chovanec 2000; Samways 2005; Smith *et al.* 2007; Silva *et al.* 2010; Simaika & Samways 2011; Kutcher & Bried 2014; Chovanec *et al.* 2015; Dutra & De Marco 2015; Golfieri *et al.* 2016; Martín & Maynou 2016; Valente-Neto *et al.* 2016).

They are especially useful as an assessment tool, because as a group, they consist of an ample number of species with different habitat requirements and which together characterize any particular water type (Samways & Steytler 1996). This is particularly useful as any change in species assemblages can indicate changes in the condition of a water body (Samways & Simaika 2016), as dragonflies are not only sensitive to water conditions (Kietzka *et al.* 2017), but they are also mobile and can rapidly respond to changing environmental conditions, either by moving towards them when favourable or away from them when not. They are also relatively easy to identify in the field as they

are often bright, colourful and conspicuous insects, and are also relatively well-known taxonomically (Corbet 1999; Kalkman *et al.* 2008).

In South Africa, a biomonitoring tool using dragonflies was created for assessing the changing conditions of its freshwater ecosystems, i.e. the Dragonfly Biotic Index (DBI). Initially, a prototype was developed by Samways and Taylor (2004), culminating in the DBI developed by Simaika and Samways (2009, 2011, 2012). The DBI is a rapid assessment tool for monitoring the conditions of South Africa's freshwater ecosystems. The DBI is based on the presence of a particular suite of adult dragonfly species at focal sites. Each species has its own DBI score, which is derived from the total of three sub-indices: 1) a species' geographical distribution, 2) its International Union for the Conservation of Nature/Species Survival Commission (IUCN/SSC) Red List status, and 3) its sensitivity to anthropogenic disturbance to its habitat. The scores of each of these DBI sub-indices range from 0 to 3, with the final DBI value of each species being the sum of scores for the three sub-indices, and which range from 0 to 9. A practical manual for freshwater assessment using the DBI has now been developed (Samways & Simaika 2016).

Using the South African DBI as a template, as well as the data collated by Kipping *et al.* (2009), a biomonitoring tool was created for the entire African continent, i.e. the African Dragonfly Biotic Index (ADBI) (see Chapter 2). The goal of the ADBI is for conservation planning and actions that may preserve or restore the different freshwater ecosystems within Africa. However, conservation planning is typically based on conservation-action units, which can be heavily influenced by the political boundaries of countries. Therefore, using the ADBI, which was created on a continental scale, for any conservation action regarding the freshwater ecosystems within any particular country, may be influenced by the political boundaries of those countries. To overcome this challenge, and to better assist freshwater managers in future to conserve these ecosystems, the ADBI (continental scale) must be modified to a national scale, i.e. creating DBI scores of 0 to 9 for each dragonfly species within each country.

The main aim of this chapter is to prioritize the African countries in terms of how close each African country is to being able to create its own national DBI scores by using the ADBI as a template and the currently available data. The null hypothesis, is that each African country (48) has an equal opportunity to create national DBI scores. This was achieved by determining: 1) the geographical distribution data and species assemblages within each country; 2) the range of IUCN/SSC Red List threat statuses within each country (from Least Concern (LC) to Critically Endangered (CR)); 3) the range of ADBI scores for each country according to the dragonfly species recorded within their borders, and 4) how the data coverage, in terms of the countries' sizes, influence the potential for a country to create its own national DBI.

2. MATERIALS AND METHODS

2.1 Background on the African Dragonfly Biotic Index

The African Dragonfly Biotic Index (ADBI) is based on a similar principle to that of the South African Dragonfly Biotic Index (DBI), i.e. to rapidly assess the changing conditions of freshwater ecosystems across the African continent. The ADBI, as with the DBI, is based on the presence of adult odonates (Anisoptera and Zygoptera) within the freshwater ecosystems, and it too consists of three sub-indices, i.e. 1) a species' geographical distribution, 2) its IUCN/SSC Red List threat status, and 3) its vulnerability to anthropogenic disturbances affecting its habitat. Likewise, any of the selected African dragonfly species can have any one sub-index score ranging from 0 to 3, and each individual species is assigned three sub-index scores. Thus, a species' ADBI score can also range from 0 to 9.

Each of the three sub-indices of the ADBI was determined at a continental scale. Therefore, the scales at which these sub-indices were calculated differ from that of the South African DBI. This means that: 1) the scoring for the species' IUCN/SSC Red List threat status was determined at a global scale (as is also the case with the South African DBI, but excluding the use of national threat statuses of species); 2) their geographical distribution was determined at the continental scale (African continent); and 3) the species vulnerability to anthropogenic disturbances to their habitats were also assessed at a continental scale, i.e. measuring the adverse anthropogenic impacts to the species preferred habitats and their possible reactions (African continent). This resulted in the South African DBI and the ADBI scores deviating to some degree (see Chapter 3).

The reason for this deviation is that the South African DBI sub-index 'geographical distribution' is based on conservation-action units, i.e. the political boundaries of state provinces. What makes this geographical sub-index workable in South Africa is that the provinces also happen to be biogeographically meaningful (i.e. Samways & Simaika 2016). This meant that an alternative geographical approach had to be adopted in the case of the entire African continent. It had to be both practical and yet useful for the development of a meaningful ADBI geographical distribution sub-index at the continental level. As regards the South African DBI sub-index 'Red List threat status', both the national and global statuses are significant, whereas for the whole continent there are no national Red List statuses, only global ones. The South African DBI sub-index 'habitat sensitivity' is based on the occurrence of dragonflies in fully natural versus human-modified or created habitats. This could be done for South Africa, as the species in the country are relatively well known, which is not so when the odonate assemblage is scaled up to a continental level (Samways & Simaika 2016).

Subsequently, the ADBI geographical distribution sub-index was calculated by means of using the Odonata Database of Africa (ODA), which is a comprehensive spatial database of individually

recorded dragonfly species across the African continent (e.g. Kipping *et al.* 2009; Dijkstra *et al.* 2011; Clausnitzer *et al.* 2012; Simaika *et al.* 2013). The geographical coordinates recorded within this database were used to determine the range sizes (latitude-longitude) of all the relevant species across Africa. The range sizes were divided into four categories that are represented by the sub-scores 0 to 3 (see Chapter 2). The ADBI threat status sub-index was determined by using the global IUCN/SSC Red List threat status, as established by the IUCN Red List Categories and Criteria, version 3.1, second edition (IUCN 2016). These threat statuses were also divided into four categories that are represented by the sub-scores 0 to 3 (see Chapter 2). The Red List threat status for each African dragonfly species was obtained from the website www.iucnredlist.org.

The ADBI species vulnerability sub-index was determined using a habitat matrix, the African Dragonfly Habitat Matrix (ADHM), which was created by 15 dragonfly specialists who described the preference of each dragonfly species for a particular habitat. This sub-index was calculated by first determining how sensitive the habitats may be to the impacts of specific anthropogenic disturbances (i.e. habitat conversion, water management and the presence of alien trees) and second, how vulnerable each species may be to these impacts within their particular habitats. This vulnerability sub-index was also divided into four categories that are represented by the sub-scores 0 to 3 (see Chapter 2). Descriptions of the respective sub-scores (0 to 3) of the three ADBI sub-indices are given in Appendix C1.

2.2 Data

The data source was the approximate 115 000 distribution records of the dragonfly species collated in the Odonata Database of Africa (ODA), as well as the ADBI scores that were determined for each dragonfly species (see Chapter 2). From the ODA, 49 African countries were identified, with their relevant dragonfly distribution records. A list of these countries (numbered alphabetically) is given in Table 4.1. Included in the table, are the sizes (km^2) of the various countries (Nations Online 2017, which is used by the United Nations when geographic sub-regions are categorized). These numbered countries are also shown in Figure 4.1. The islands that occur around the African continent, with their relevant recorded data, were excluded from any calculations, as they were not used in the IUCN/SSC continental freshwater assessment (Darwall *et al.* 2011). Likewise, as the ODA includes both historical and current distribution data, Morocco is separated into the two countries as listed in the ODA, i.e. Morocco is both Morocco and Western Africa.

Table 4.1. A list of the 49 African countries identified from the Odonata Database of Africa (ODA). As the ODA includes both historical and current distribution data, Morocco is separated into two countries, i.e. Morocco is both Morocco (no. 30) and Western Sahara (no. 47). Also included in the table, are the countries' relevant geographical sizes (km^2). Excluded are all the islands that occur around the continent (e.g. Madagascar, Seychelles, Mauritius, Cape Verde, and São Tomé and Príncipe Islands). These numbered countries are also those in Figure 4.1.

No.	Country	Size (km^2)	No.	Country	Size (km^2)
1	Algeria	2 380 000	26	Libya	1 759 540
2	Angola	1 246 700	27	Malawi	118 484
3	Benin	112 622	28	Mali	1 241 238
4	Botswana	582 000	29	Mauritania	1 030 000
5	Burkina Faso	274 222	30	Morocco	446 550
6	Burundi	27 834	31	Mozambique	801 590
7	Cameroon	475 650	32	Namibia	824 292
8	Central African Republic	622 984	33	Niger	1 267 000
9	Chad	1 284 000	34	Nigeria	923 768
10	Congo, Republic of	342 000	35	*(Republic of) South Africa*	1 200 000
11	Cote d'Ivoire (Ivory Coast)	322 463	36	Rwanda	26 338
12	Democratic Republic of Congo	2 344 858	37	Senegal	196 722
13	Djibouti	23 200	38	Sierra Leone	71 740
14	Egypt	1 000 000	39	Somalia	637 657
15	Equatorial Guinea	28 000	40	South Sudan	644 326
16	Eritrea	117 600	41	Sudan	1 861 484
17	Ethiopia	1 126 829	42	Swaziland	17 364
18	Gabon	267 668	43	Tanzania	945 087
19	Gambia	11 300	44	Togo	56 785
20	Ghana	238 391	45	Tunisia	163 610
21	Guinea-Bissau	36 000	46	Uganda	241 551
22	Guinea	245 857	47	Western Sahara	267 000
23	Kenya	580 000	48	Zambia	752 618
24	Lesotho	30 355	49	Zimbabwe	390 757
25	Liberia	111 369			

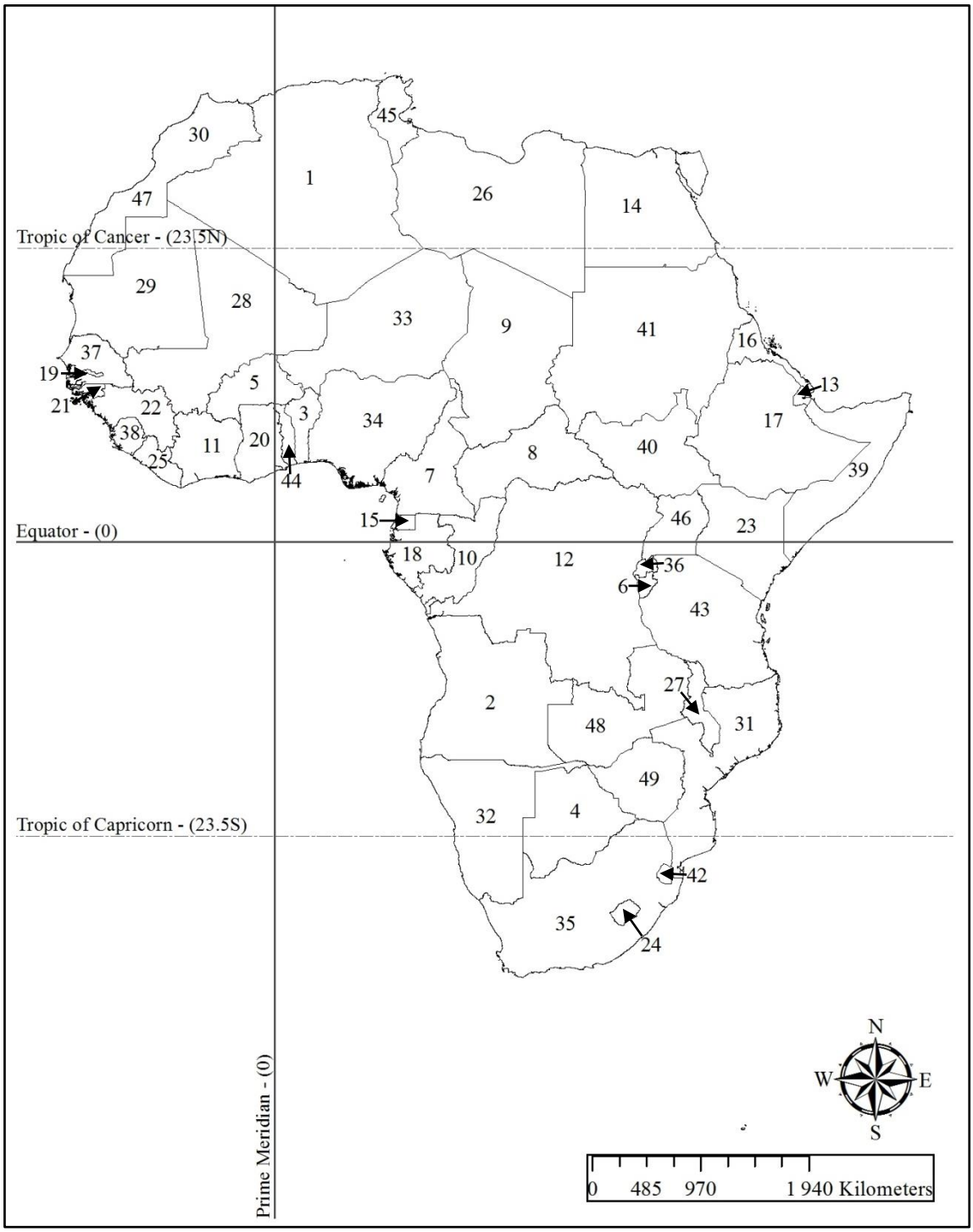


Figure 4.1. A map of the African continent with its 49 countries as numbered in Table 4.1. Excluded are all the islands that occur around the continent (e.g. Madagascar, Seychelles, Mauritius, Cape Verde, and São Tomé and Príncipe Islands).

2.3 Data analyses

The data were sub-divided according to the 49 African countries, although only 48 countries were used in all analyses and map making (with South Africa excluded as it already has its own national Dragonfly Biotic Index (DBI) scores). The South African DBI was a reference against which all the other 48 national DBIs were compared. This was a realistic benchmark as the South African DBI has already been developed, and is currently being used extensively. Consequently, to determine which countries have the potential to create national DBI scores, the data were examined as follows. First, the statistical range of the recorded data was assessed for each country, i.e. the number of species (species richness), the number of recorded individuals (a rough surrogacy for abundance, notwithstanding sampling effort) and the number of species recorded for each IUCN/SSC Red List threat status. Second, the distribution data (from the ODA) and the ADBI scores, which were calculated for 604 African dragonfly species (see Chapter 2), were combined to determine the range of ADBI scores for each country.

Third, a non-parametric Spearman Rank Correlation ($-0.7 \leq r \leq 0.7$) was used to determine how the range of ADBI scores of each country rank according to the South Africa DBI. This was achieved by comparing the range of the South African DBI scores with the range of ADBI scores of each country. Specifically, comparing the number of species recorded for each of the South African DBI scores (South African species) with the number of species recorded for each of the ADBI scores of each country (the 604 African species). Finally, the data coverage of each country was used to determine which countries are, realistically, able to create national DBI scores. The data coverage was calculated by using the number of recorded individuals and number of species, as well as the range of the ADBI scores, of each country and evaluating them according to the size (km^2) of the respective countries. The 48 countries were then categorized according to their data coverage (from highest to lowest) to determine which countries are realistically able to create their own national DBI scores (excellent data coverage) to those that need a great deal more information (poor data coverage). All data were interrogated using STATISTICA 13 (Dell Inc. 2016) and all maps created using the programme ArcGIS version 10.0 (ESRI 2010).

3. RESULTS

3.1 The data range of the 48 African countries

The number of dragonfly species recorded within each country, range from countries that have over 200 recorded species (e.g. Democratic Republic of Congo with 332 species, and Zambia with 224 species) to countries that have <10 recorded species within their borders (e.g. Djibouti with 8 species,

and Western Sahara with 6 species) (Table 4.2). Of the 48 countries, 27 have <100 species recorded within their borders, e.g. Burkina Faso with 59 species, Chad with 45 species, Eritrea with 20 species, Mauritania with 24 species, and Somalia with 55 species (Table 4.2). Therefore, it is possible that the species compositions may be more similar among these countries, i.e. more of the same castes of species (common, widespread, non-threatened and highly tolerant) are recorded within these countries than those that are not (highly restricted and vulnerable species). This may result in low recorded national DBI scores, making it more difficult to detect any changes in the water bodies of these countries, as the highly tolerant species may be within any habitat type (e.g. *Crocothemis erythraea* occurs regularly in artificial water bodies).

The recorded number of dragonfly individuals per country could also be categorized into three groups based on relative sampling effort. Group 1 has ≥3 000 records (10 countries), e.g. Gabon with 9 973 records and Cameroon with 3 341 records. Group 2 has <3 000 records, but ≥1 000 records (14 countries), e.g. Kenya with 2 918 records and Ethiopia with 1 000 records. Group 3 has <1 000 records (24 countries), e.g. Benin with 887 records and Western Sahara with 11 records (Table 4.2). The countries of groups 1 and 2 are very well to reasonably well sampled, and may be close to developing their own national DBI scores. On the other hand, the dragonfly assemblages in countries in group 3 need to be assessed further.

In addition, countries such as Algeria, Cameroon, Kenya, Tanzania and Uganda have reasonably wide ranges of species in terms of their global IUCN/SSC Red List threat statuses, e.g. Cameroon has species with threat statuses, including those that are ‘Least Concern’, as well as those that range from ‘Near Threatened’ to those that are ‘Critically Endangered’ (Table 4.3). This means the possibility exists for these countries to create national threat statuses and thus, national DBI scores. However, 23 of the 48 countries only have species that are classified as ‘Least Concern’ and will therefore, need extensive re-consideration when developing their national Red List threat status sub-index, e.g. Benin, Egypt, Ghana, Mali, Sierra Leone and Togo (Table 4.3). The extent of the species’ recorded distributions within each country is shown as maps of the respective countries in Appendix C2. Lists of the species recorded from each country (including their respective ADBI scores and Red List threat statuses) are given in Appendix C3.

Table 4.2. The 49 African countries with the number of dragonfly species, as well as the number of individuals, recorded within each country. These records were obtained from the Odonata Database of Africa. The records of South Africa are included only as a reference, since the country already has a national Dragonfly Biotic Index.

Country	Number of species	Number of records	Country	Number of species	Number of records
Algeria	60	1 934	Libya	28	309
Angola	195	2 181	Malawi	144	2 727
Benin	92	887	Mali	71	416
Botswana	120	6 566	Mauritania	24	255
Burkina Faso	59	269	Morocco	60	4 188
Burundi	11	13	Mozambique	137	1 956
Cameroon	213	3 341	Namibia	124	8 024
Central African Republic	105	385	Niger	30	215
Chad	45	251	Nigeria	203	1 606
Congo, Republic of	156	1 432	*(Republic of) South Africa*	162	25 682
Cote d'Ivoire (Ivory Coast)	152	785	Rwanda	41	50
Democratic Republic of Congo	332	6 044	Senegal	66	671
Djibouti	8	20	Sierra Leone	155	1 332
Egypt	32	1 211	Somalia	55	371
Equatorial Guinea	69	108	South Sudan	58	167
Eritrea	20	35	Sudan	55	558
Ethiopia	99	1 000	Swaziland	52	237
Gabon	223	9 973	Tanzania	174	1 948
Gambia	75	1 337	Togo	91	477
Ghana	167	1 900	Tunisia	54	2 444
Guinea-Bissau	64	393	Uganda	213	4 599
Guinea	107	431	Western Sahara	6	11
Kenya	163	2 918	Zambia	224	5 304
Lesotho	12	15	Zimbabwe	153	4 182
Liberia	185	4 054			

Table 4.3. The number of dragonfly species recorded for the particular global IUCN/SSC Red List categories, for each of the 48 African countries. IUCN/SSC threat status abbreviations used (IUCN 2016): LC – Least Concern, NT – Near Threatened, DD – Data Deficient, VU – Vulnerable, EN – Endangered, and CR – Critically Endangered. Excluded are the South Africa records as the country already has both national and global threat statuses as well as a national Dragonfly Biotic Index.

Country	Number of species						Country	Number of species					
	LC	DD	NT	VU	EN	CR		LC	DD	NT	VU	EN	CR
Algeria	55	1	2	1	0	1	Liberia	183	0	1	0	1	0
Angola	192	0	3	0	0	0	Libya	28	0	0	0	0	0
Benin	92	0	0	0	0	0	Malawi	139	0	2	2	0	1
Botswana	117	1	2	0	0	0	Mali	71	0	0	0	0	0
Burkina Faso	59	0	0	0	0	0	Mauritania	24	0	0	0	0	0
Burundi	11	0	0	0	0	0	Morocco	57	0	2	0	0	1
Cameroon	204	3	1	2	2	1	Mozambique	134	0	1	2	0	0
Central African Republic	104	1	0	0	0	0	Namibia	119	1	4	0	0	0
Chad	45	0	0	0	0	0	Niger	29	0	1	0	0	0
Congo, Republic of	155	0	1	0	0	0	Nigeria	200	0	0	1	1	1
Cote d'Ivoire	152	0	0	0	0	0	Rwanda	40	0	1	0	0	0
Democratic Republic of Congo	327	0	3	2	0	0	Senegal	66	0	0	0	0	0
Djibouti	8	0	0	0	0	0	Sierra Leone	155	0	0	0	0	0
Egypt	32	0	0	0	0	0	Somalia	55	0	0	0	0	0
Equatorial Guinea	69	0	0	0	0	0	South Sudan	58	0	0	0	0	0
Eritrea	20	0	0	0	0	0	Sudan	54	0	1	0	0	0
Ethiopia	90	0	3	4	2	0	Swaziland	52	0	0	0	0	0
Gabon	220	0	3	0	0	0	Tanzania	166	0	2	4	1	1
Gambia	75	0	0	0	0	0	Togo	91	0	0	0	0	0
Ghana	167	0	0	0	0	0	Tunisia	50	0	2	1	0	1
Guinea-Bissau	64	0	0	0	0	0	Uganda	207	0	3	1	1	1
Guinea	106	0	1	0	0	0	Western Sahara	6	0	0	0	0	0
Kenya	158	0	1	2	1	1	Zambia	219	2	3	0	0	0
Lesotho	12	0	0	0	0	0	Zimbabwe	146	2	4	1	0	0

3.2 The range of ADBI scores of the 48 African countries

The ranges of ADBI scores, meaning the number of species recorded per score (0 to 9), for each of the 48 African countries is shown in Figure 4.2 (a-f). Some countries, such as Ethiopia and Kenya, have a full range of ADBI scores (Fig. 4.2c), while others have a range of ADBI scores of only 0 to 3, such as Somalia (Fig. 4.2e). In addition, of the 48 African countries, one country has a range of ADBI scores from 0 to 8 (Uganda, Fig. 4.2f), three countries have a range of ADBI scores from 0 to 7 (e.g. Algeria, Fig. 4.2a), and six have a range of ADBI scores from 0 to 6 (e.g. Guinea, Fig. 4.2c). Fourteen countries have an average range of ADBI scores from 0 to 5, such as Angola (Fig. 4.2a), Equatorial Guinea (Fig. 4.2b), Namibia (Fig. 4.2d), Sierra Leone (Fig. 4.2e) and Togo (Fig. 4.2 f). Also, some of the countries do not have recorded species for certain ADBI scores, e.g. Tanzania has a range of ADBI scores from 0 to 7 and then again species with a recorded ADBI score of 9 (Fig. 4.2f).

To determine how the ADBI scores of each country rank against the South African DBI, a non-parametric Spearman Rank Correlation was used to compare the number of species recorded for the South African DBI scores (162 South African species) with the number of species recorded for the ADBI scores of each country. Correlations were considered to be strong if the r-values fall outside the range of $-0.7 \leq r \leq 0.7$. It was found that 13 of the 48 countries were strongly correlated regarding their ADBI scores ($p<.05$), i.e. their r-values are above 0.60 at $p<.05$ (Table 4.4). These countries include: Algeria, Angola, Cameroon, Congo (Republic of), Democratic Republic of Congo, Gabon, Lesotho, Morocco, Mozambique, Tanzania, Tunisia, Zambia and Zimbabwe (Table 4.4). However, as seen in Figure 4.2 (a-b, d-f) some of the countries, such as Cameroon and Tanzania, do not have the full range of ADBI values, which could be a challenge when developing national DBI scores for these countries. Moreover, Lesotho only has a range of ADBI scores 0 to 4, as well as a small number of species (12) and individuals (15) recorded within its borders (Table 4.2 and Fig. 4.2c). The fact that it showed a significant range of ADBI scores could be due to the country being situated within the borders of South Africa, i.e. the same set of species are recorded within Lesotho and South Africa.

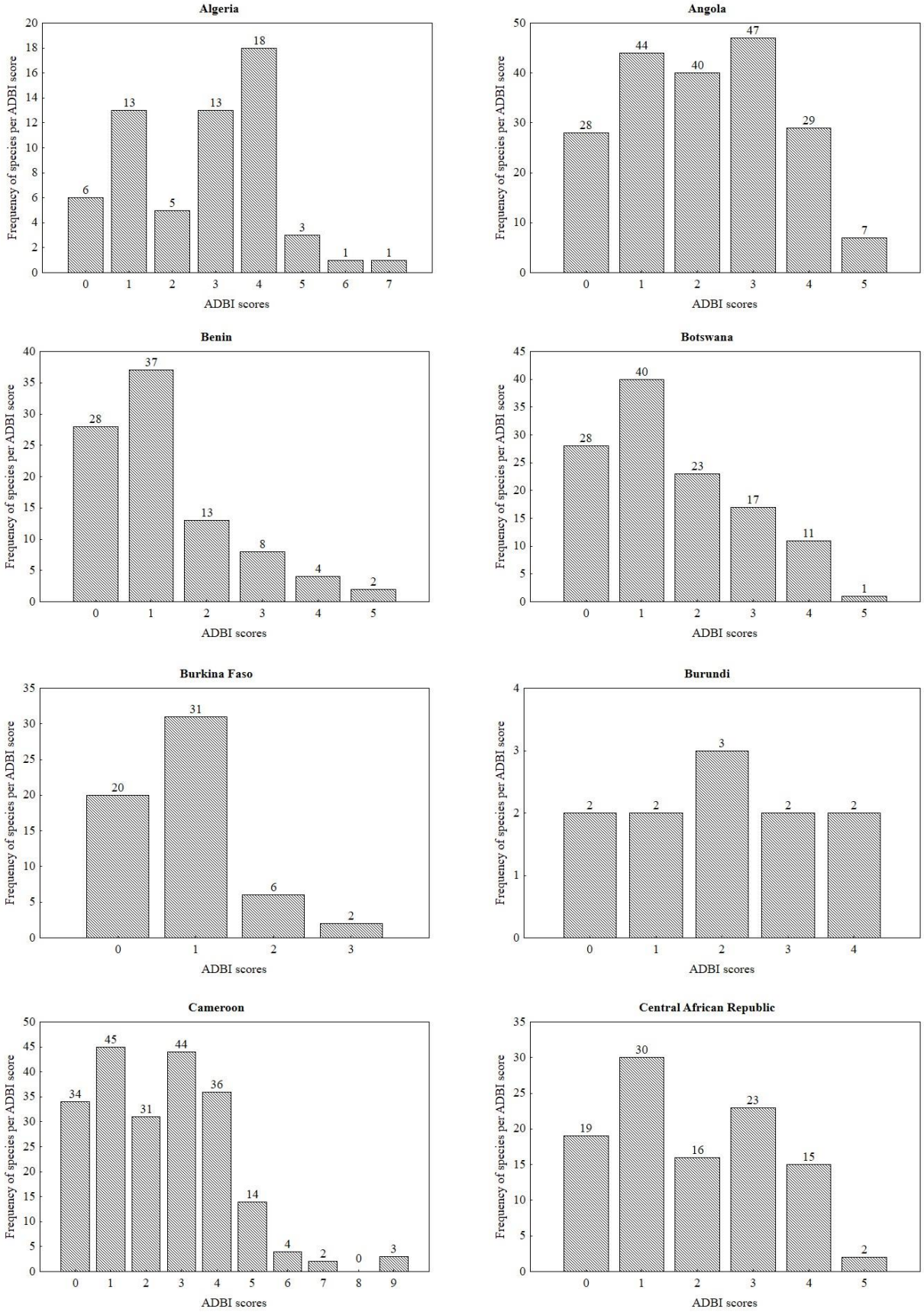


Figure 4.2a. Frequency of species per African Dragonfly Biotic Index (ADBI) scores for the countries Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon and Central African Republic.

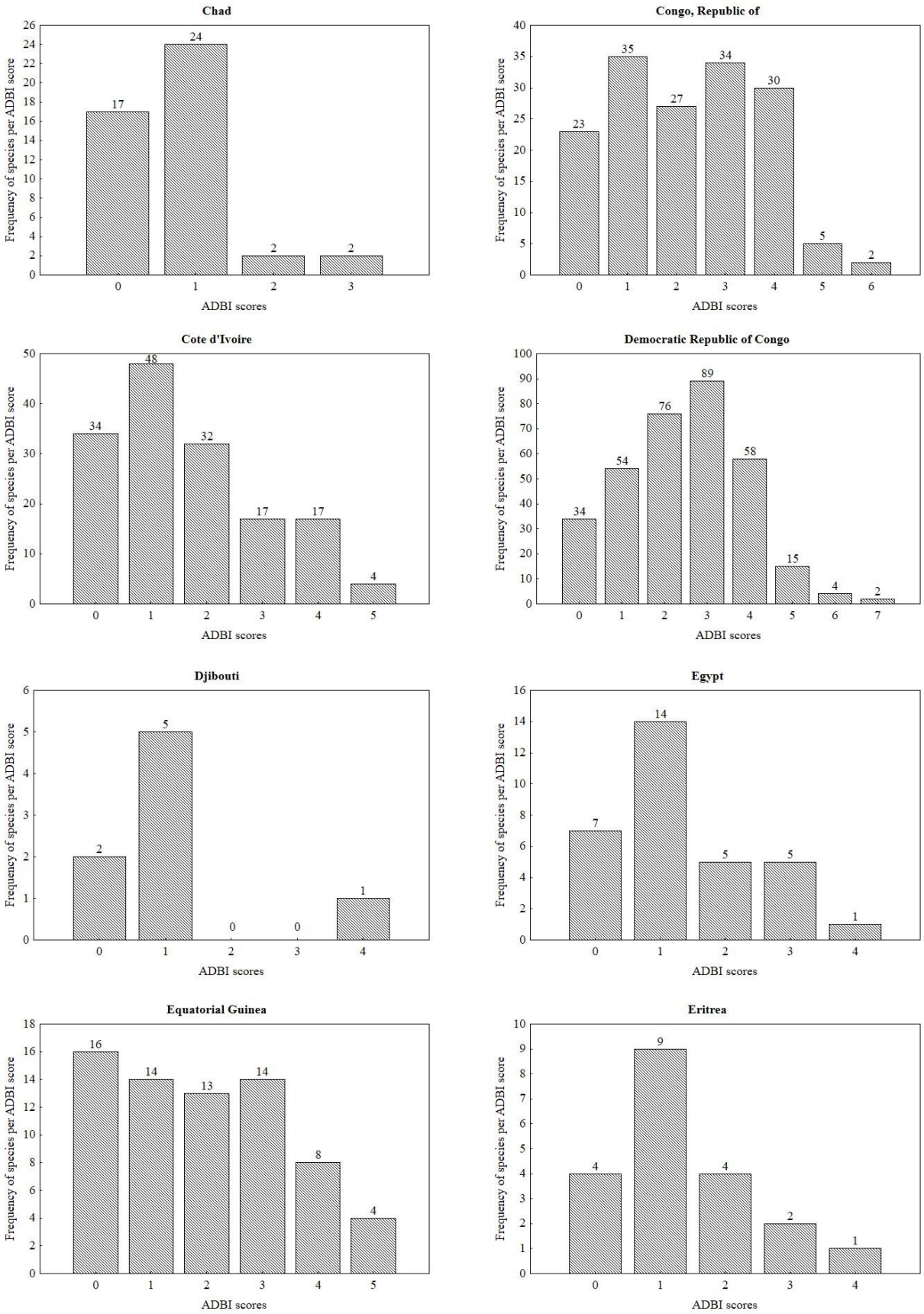


Figure 4.2b. Frequency of species per African Dragonfly Biotic Index (ADBI) scores for the countries Chad, Congo (Republic of), Cote d'Ivoire, Democratic Republic of Congo, Djibouti, Egypt, Equatorial Guinea and Eritrea.

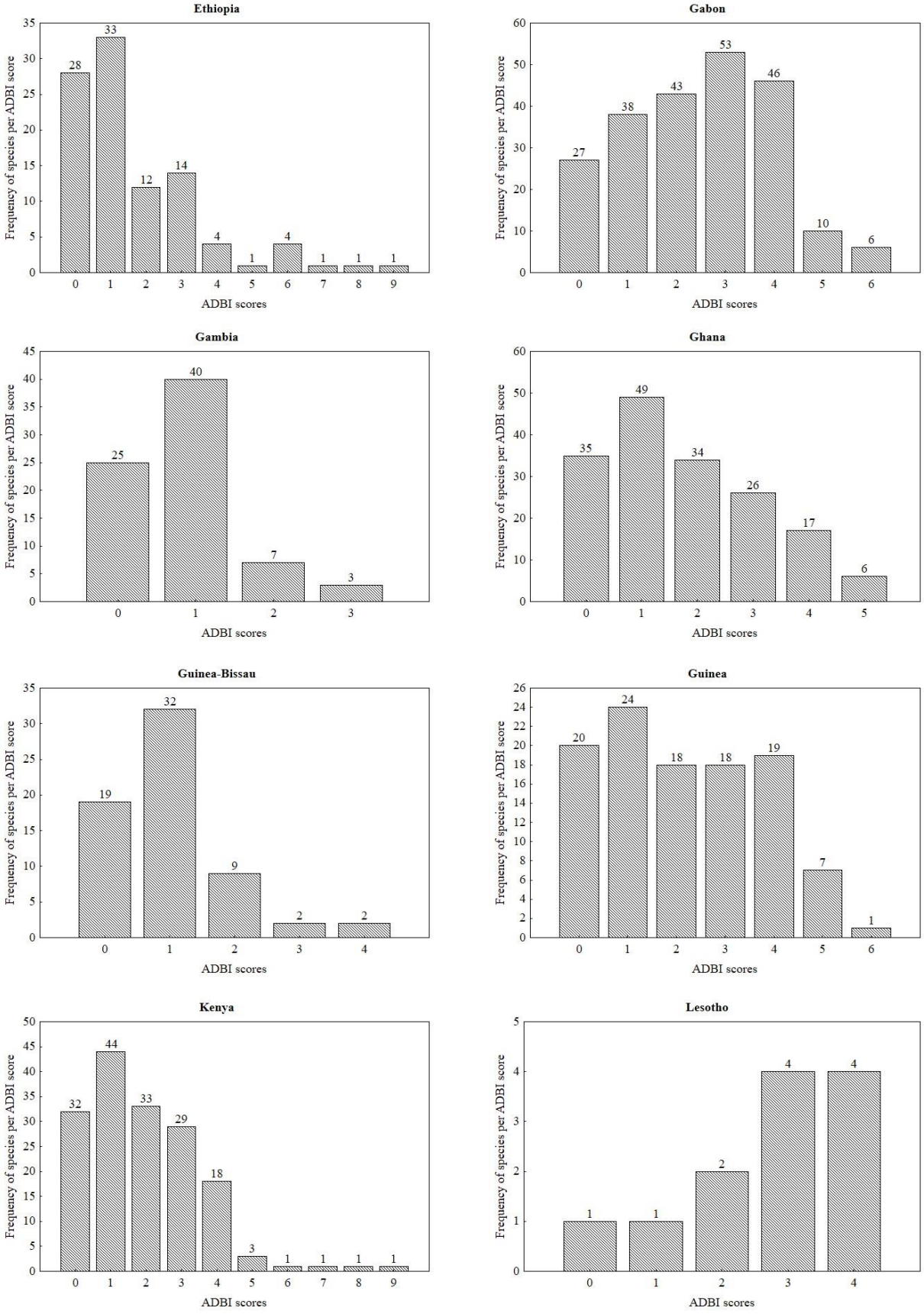


Figure 4.2c. Frequency of species per African Dragonfly Biotic Index (ADBI) scores for the countries Ethiopia, Gabon, Gambia, Ghana, Guinea-Bissau, Guinea, Kenya and Lesotho.

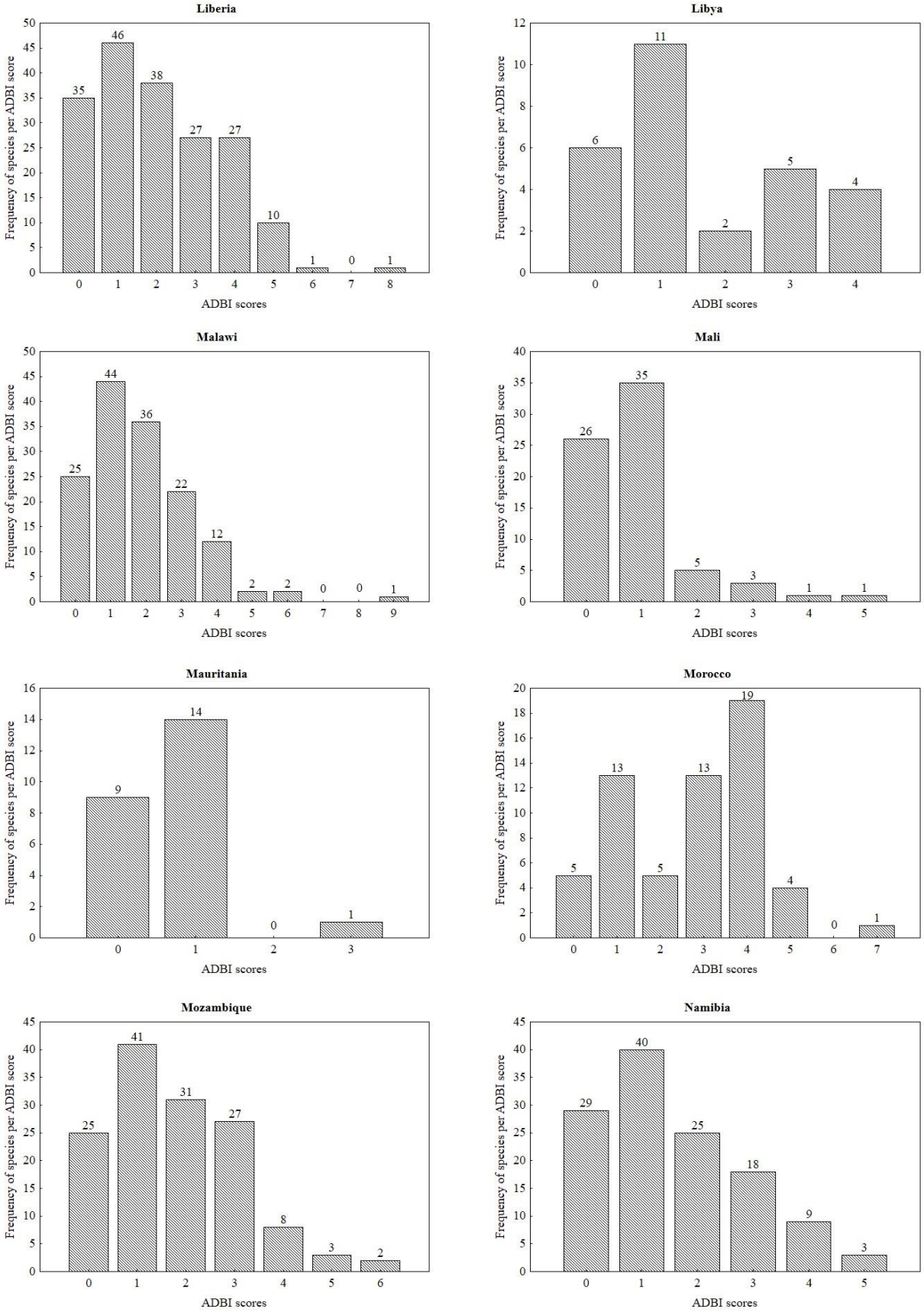


Figure 4.2d. Frequency of species per African Dragonfly Biotic Index (ADBI) scores for the countries Liberia, Libya, Malawi, Mali, Mauritania, Morocco, Mozambique and Namibia.

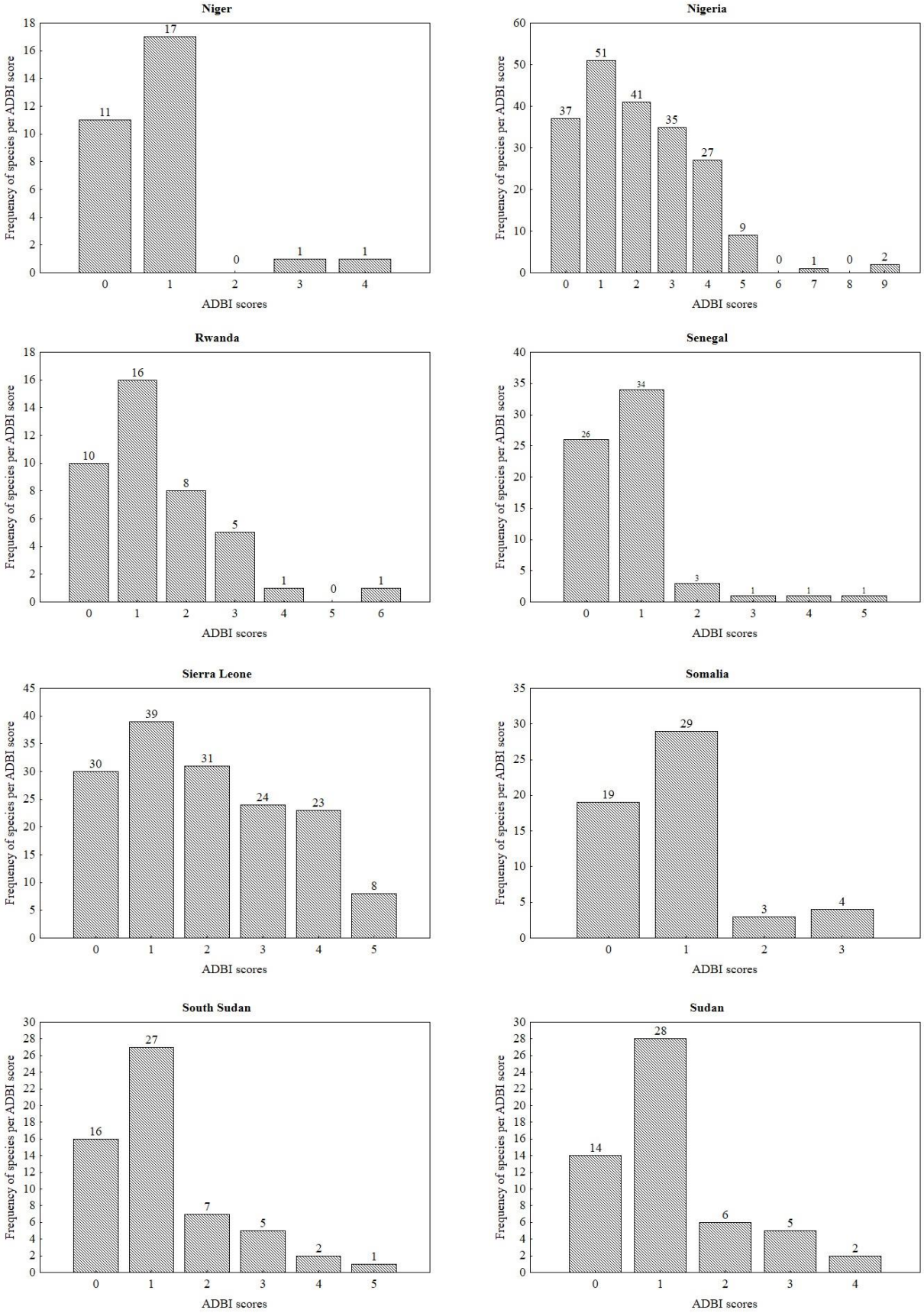


Figure 4.2e. Frequency of species per African Dragonfly Biotic Index (ADBI) scores for the countries Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Somalia, South Sudan and Sudan. Excluded are the records of the Republic of South Africa as the country already has a national Dragonfly Biotic Index.

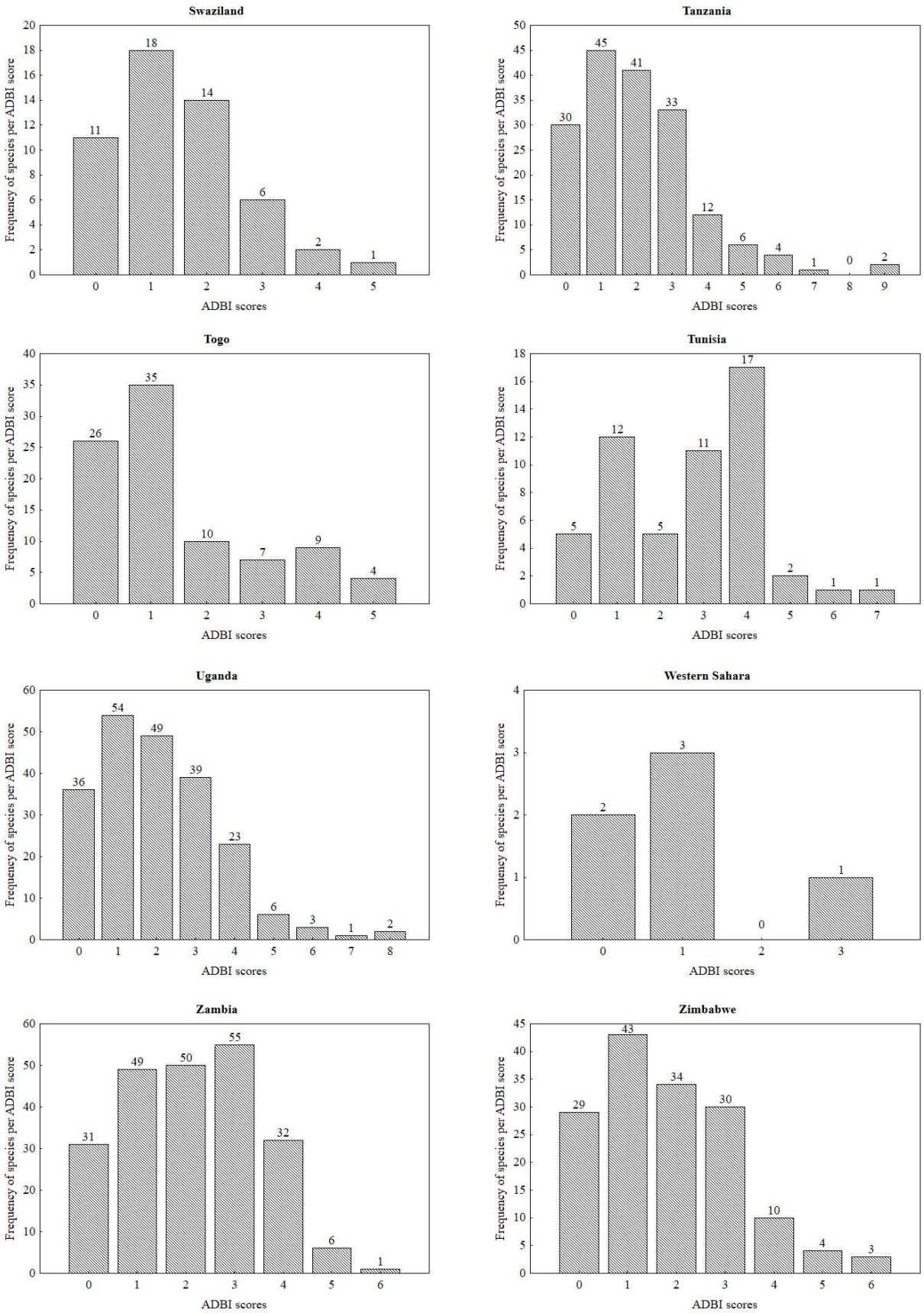


Figure 4.2f. Frequency of species per African Dragonfly Biotic Index (ADBI) scores for the countries Swaziland, Tanzania, Togo, Tunisia, Uganda, Western Sahara, Zambia and Zimbabwe.

Table 4.4. Non-parametric Spearman Rank correlation values ($-0.7 \leq r \leq 0.7$) calculated for the 48 African countries. This was achieved by comparing the range of the South African Dragonfly Biotic Index scores 0 to 9 (i.e. number of species per score) with the range of African Dragonfly Biotic Index scores 0 to 9 (i.e. number of species per score) of each country. Significance is indicated with an asterisks (*) ($p<.05$). Excluded are the South Africa records as the country already has a national Dragonfly Biotic Index.

Country	Spearman R	p-value	Country	Spearman R	p-value
Algeria*	0.74	0.015	Liberia	0.57	0.087
Angola*	0.65	0.042	Libya	0.35	0.321
Benin	0.48	0.160	Malawi	0.58	0.080
Botswana	0.48	0.160	Mali	0.47	0.172
Burkina Faso	0.17	0.629	Mauritania	-0.02	0.951
Burundi	0.60	0.066	Morocco*	0.71	0.022
Cameroon*	0.64	0.047	Mozambique*	0.63	0.049
Central African Republic	0.49	0.148	Namibia	0.48	0.160
Chad	0.16	0.656	Niger	0.22	0.548
Congo, Republic of*	0.70	0.026	Nigeria	0.50	0.138
Cote d'Ivoire	0.50	0.141	Rwanda	0.37	0.286
Democratic Republic of Congo*	0.81	0.004	Senegal	0.50	0.142
Djibouti	0.16	0.665	Sierra Leone	0.54	0.105
Egypt	0.35	0.319	Somalia	0.15	0.685
Equatorial Guinea	0.45	0.196	South Sudan	0.48	0.160
Eritrea	0.40	0.256	Sudan	0.36	0.302
Ethiopia	0.35	0.323	Swaziland	0.54	0.105
Gabon*	0.81	0.004	Tanzania*	0.64	0.047
Gambia	0.17	0.629	Togo	0.52	0.126
Ghana	0.48	0.160	Tunisia*	0.76	0.011
Guinea-Bissau	0.38	0.273	Uganda	0.61	0.059
Guinea	0.57	0.083	Western Sahara	-0.02	0.951
Kenya	0.54	0.105	Zambia*	0.74	0.013
Lesotho*	0.67	0.034	Zimbabwe*	0.63	0.049

3.3 Prioritizing 48 African countries: possible national DBI scores

To counteract the possible problems of inadequate recorded data and uneven ranges of ADBI scores, the data coverage of each country was investigated using two approaches. The first approach was to determine only the level of data coverage per country, i.e. multiplying the number of records with the number of species recorded for each country and divide this number by the size (km^2) of that country (Appendix C4). The second approach was to determine the level of data coverage and include the range of ADBI scores per country, i.e. the number of records of each country was multiplied with the number of species of that country, which was then further multiplied by the number of DBI points recorded for each country. These values were then divided by the size (km^2) of the relevant countries. The DBI points were calculated using the range of ADBI scores of each country, e.g. if a country has a range of ADBI scores 0 to 9, the country has a DBI point of 10; or if a country has a range of ADBI scores 0 to 5, the country has a DBI point of 6 (Appendix C5). The South African DBI scores range from 0 to 9 and therefore, the country has a DBI score range of 10 points. This DBI point range is used as a reference against which the other countries' DBI point ranges could be compared. These calculations provided two main groups of countries that may soon be able to develop national DBI scores, i.e. Group 1 in Appendix C4 and Group 2 in Appendix C5. In addition, the second group of calculations helped to determine whether there will be any differences or shifts among the countries when the DBI points are added to the data coverage. This may futher assist in prioritizing which of the 48 African countries will be able to create national DBI scores in the short term.

To determine which countries are close to being able to create national DBI scores to those that are far from it, the calculated data coverage of the countries were rearranged in a descending order, i.e. greatest data coverage at the top, with the poorest data coverage at the bottom for both groups. The countries were then arbitrarily categorized into four quartiles, each containing 12 countries (Fig. 4.3). The quartiles are as follows: 1) the first quartile contains the countries with excellent quality data coverage that are on the threshold of developing their own national DBI scores with no to very few adjustments to the current data; 2) the second quartile contains the countries with good quality data coverage that have the potential to develop national DBI scores, with possibly some adjustments to the data; 3) the third quartile contains the countries with poorer quality data coverage that might only be able to create national DBI scores if much more data are gathered for each country (i.e. distribution records, IUCN/SSC Red List threat status, etc.); and 4) the fourth quartile contains those countries with very poor quality data coverage and are least likely to be able to develop their own national DBI scores without considerably more data gathering and deep consideration of the feasibility of developing their own national DBIs.

First Quartile			
No.	**Group 1**	**No.**	**Group 2**
1	Gambia	1	Gabon*
2	Gabon*	2	Liberia
3	Liberia	3	Uganda
4	Uganda	4	Gambia
5	Malawi	5	Malawi
6	Sierra Leone	6	Sierra Leone
7	Zimbabwe*	7	Cameroon*
8	Zambia*	8	Zimbabwe*
9	Cameroon*	9	Zambia*
10	Botswana	10	Kenya
11	Ghana	11	Botswana
12	Namibia	12	Ghana

Second Quartile			
No.	**Group 1**	**No.**	**Group 2**
1	Democratic Republic of Congo*	1	Namibia
2	Kenya	2	Democratic Republic of Congo*
3	Tunisia*	3	Tunisia*
4	Togo	4	Togo
5	Benin	5	Congo, Republic of*
6	Swaziland	6	Benin
7	Guinea-Bissau	7	Swaziland
8	Congo, Republic of*	8	Morocco*
9	Morocco*	9	Guinea-Bissau
10	Cote d'Ivoire	10	Tanzania*
11	Tanzania*	11	Nigeria
12	Nigeria	12	Mozambique*

Third Quartile			
No.	**Group 1**	**No.**	**Group 2**
1	Angola*	1	Cote d'Ivoire
2	Mozambique*	2	Angola*
3	Equatorial Guinea	3	Equatorial Guinea
4	Senegal	4	Senegal
5	Guinea	5	Guinea
6	Ethiopia	6	Ethiopia
7	Rwanda	7	Rwanda
8	Central African Republic	8	Algeria*
9	Burkina Faso	9	Central African Republic
10	Algeria*	10	Burkina Faso
11	Egypt	11	Egypt
12	Somalia	12	Mali

Fourth Quartile			
No.	**Group 1**	**No.**	**Group 2**
1	Mali	1	Somalia
2	Sudan	2	South Sudan
3	South Sudan	3	Sudan
4	Chad	4	Chad
5	Djibouti	5	Eritrea
6	Eritrea	6	Lesotho*
7	Mauritania	7	Burundi
8	Lesotho*	8	Libya
9	Burundi	9	Djibouti
10	Niger	10	Niger
11	Libya	11	Mauritania
12	Western Sahara	12	Western Sahara

Figure 4.3. The two groups of categorized countries (i.e. Group 1 in Appendix C4 and Group 2 in Appendix C5) are compared within each of the four quartiles. The first quartile contains the first 12 countries that have the potential to create national Dragonfly Biotic Index (DBI) scores with no to very few adjustments to their current data. The second quartile contains the next 12 countries that also have the potential to create national DBI scores with some modifications to their data. The third quartile contains the 12 countries that might be able to create national DBI scores, but with the gathering of much more data from the countries. The fourth quartile contains the 12 countries the least likely to create their own national DBI scores with the current data recorded within their borders. The countries that have suitably wide distributions of ADBI scores, according to the r-values of Spearman, are indicated with asterisks (*).

3.3.1 The First Quartile

The 12 countries in the first quartile, of both groups, have good data coverage regarding the number of species (>100) and records (>1 000) gathered according to the various sizes of the countries (Appendices C4 and C5). Also, the DBI points for their ranges of ADBI scores, which were included in Group 2, span from 6 to 10, which increases the potential for creating national DBI scores in these countries (Appendix C5). The exception is Gambia, which has a DBI point of 4 and <100 recorded species, yet the number of records gathered is considerable and could augment the lower ADBI scores when creating national DBI scores for this country (Appendix C5). In addition, four countries (i.e. Cameroon, Gabon, Zambia and Zimbabwe) within this first quartile, have wide enough ranges of ADBI scores to create national DBI scores (Table 4.4 and Fig. 4.3). The spread of the species' distributions within these 12 countries are also, for the most part, of good quality (Appendix C2). However, some of these countries do have some spatial gaps where no data have yet been gathered, i.e. Botswana, Cameroon, Gabon, Ghana, Liberia, Sierra Leone, Uganda, Zambia and Zimbabwe (Appendix C2). Nonetheless, the number of records gathered for these countries are sufficient to create workable national DBI scores.

3.3.2 The Second Quartile

The next 12 countries in the second quartile of both groups have, for the most part, fair (Tanzania) to excellent (Democratic Republic of Congo) data coverage in terms of the number of species (>100) and records (>1 000) gathered (Appendices C4 and C5). Yet, four of these countries (i.e. Benin, Guinea-Bissau, Swaziland and Togo) have <100 recorded species and <1 000 recorded individuals (Appendices C4 and C5), and the spread of the species' distributions within these countries are patchy (Appendix C2). In fact, of these 12 countries, only the Democratic Republic of Congo has a good spread in terms of its species' distributions, with very few gaps (Appendix C2). However, five (Group 1) or six (Group 2) countries (depending on the groups) have, wide enough ranges of ADBI scores to create national DBI scores (Table 4.4 and Fig. 4.3). In addition, the DBI points for Group 2 in this quartile are mostly high (6 to 9 points) and may contribute to the near-potential of creating national DBI scores for these countries (Appendix C5). An exception is Guinea-Bissau, which only has an average DBI point of 5, making it more difficult to create national DBI scores for this country (Appendix C5). Nonetheless, most of the countries within the second quartile are able to create national DBI scores, with no or very little additional data (e.g. species and recorded individuals).

3.3.3 The Third Quartile

The 12 countries in the third quartile of both groups have, in general, poor data coverage in terms of the species (<100) and records (<1 000) gathered according to the various sizes of the countries (Appendices C4 and C5). Angola and Mozambique are the exceptions that have >100 species and >1 000 records collected within their borders (Appendix C4). There are also a few countries (i.e. Ethiopia, Algeria and Egypt) that may have a small number of species (<100), but do have a >1 000 distribution records, which could help with the development of their national DBI scores (Appendices C4 and C5). Furthermore, the spread of the species' distributions within these countries range from those that is less patchy (Ethiopia) to those that are very patchy (Rwanda) (Appendix C2). Likewise, the DBI points for Group 2 in this quartile range from average (4-5 points) to very good (6-10 points), and may strengthen the development of national DBI scores for each country (Appendix C5). In addition, three (Group 1: Algeria, Angola and Mozambique) or two (Group 2: only Algeria and Angola) countries (depending on the groups) within this quartile have, wide enough ranges of ADBI scores to create national DBI scores (Table 4.4 and Fig. 4.3). Nevertheless, these countries require much more effort in the collection of necessary data, i.e. additional distribution data needs to be added (i.e. species and recorded individuals) and the Red List threat statuses of the species may need to be re-evaluated.

3.3.4 The Fourth Quartile

The last 12 countries in the fourth quartile, of both groups, have very poor data coverage in terms of the numbers of species (<100) and distribution records (<1 000) gathered within these countries (Appendices C4 and C5). Also, the DBI points range from good (6 points) to below average (3 points), making it currently not feasible to create national DBI scores for these countries (Appendix C5), without gathering much more basic data (i.e. recorded species and individuals). In addition, the spread of the species' distributions within all 12 countries are very patchy (Appendix C2), making it even more difficult to develop national DBI scores. Nevertheless, according to Spearman, Lesotho has a significant enough range of ADBI scores to be able to develop national DBI scores (Table 4.4 and Fig. 4.3). However, this country has very few recorded species (12) and individuals (15), as well as a below average range of ADBI scores of 0 to 4 (Appendix C5). This may be explained by the fact that the country is situated within the borders of South Africa (Fig. 4.1) and therefore, the same set of species is recorded within Lesotho and South Africa. Consequently, the countries of this quartile require a lot more effort in the collection of necessary data, i.e. additional distribution data needs to be added (i.e. species and recorded individuals) and the Red List threat statuses of the species may need to be re-evaluated.

3.3.5 Shifts in countries among the four quartiles

There are also some differences between the 12 countries listed in each quartile for both groups (Appendices C4 and C5), i.e. some of the countries shifted (either upwards or downwards) in terms of their ranking within the quartiles, and there was also a change in a country's position among the four quartiles between the two groups (Table 4.5). These shifts were determined when the DBI points were added to the data coverage of each country, i.e. the DBI points may increase the potential for creating national DBI scores in these countries. For example, Namibia and Kenya switched places between the first and second quartiles of the two groups, i.e. Group 1 in the first quartile includes Namibia and the second quartile includes Kenya, but in Group 2 it is the reverse, with the first quartile including Kenya and the second quartile including Namibia (Table 4.5 and Fig. 4.3). There is also a switch between the second and third quartiles between the two groups, i.e. Group 1 in the second quartile includes Cote d'Ivoire and the third quartile includes Mozambique, but in Group 2 it is again a reverse with the second quartile including Mozambique and the third quartile containing Cote d'Ivoire (Table 4.5 and Fig. 4.3). A final switch is between the third and fourth quartiles of the two groups, i.e. Group 1 in the third quartile includes Somalia and the fourth quartile includes Mali, while in Group 2 it is the reverse, with the third quartile including Mali and the fourth quartile including Somalia (Table 4.5 and Fig. 4.3). This may mean that the contribution of the range of ADBI scores to the data coverage for the creation of national DBI scores are not as influential as initially thought. Nevertheless, the range of ADBI scores for some of the countries does provide a starting point for these countries to create their own national DBI scores.

Table 4.5. The two groups of categorized countries (i.e. Group 1 in Appendix C4 and Group 2 in Appendix C5) are compared with each other to clarify the possibilities of the countries in Group 1 repositioning in Group 2 due to the additional Dragonfly Biotic Index points that were added to the calculations of Group 2. Any shifts in the countries' positions within the quartiles are indicated as follows: downward shifts are indicated with an arrow pointing down (↓), while upward shifts are indicated with an arrow pointing up (↑). Where there are no shifts between the two groups it is shown with an equal sign (=). Furthermore, the numbers next to the arrows specify the extent to which the countries have shifted within the quartiles, e.g. 1 ↑ indicates that the country has move one position up within the quartiles.

Quartiles	No.	Group 1	Shifts	No.	Group 2
First	1	Gambia	3 ↓	1	Gabon
	2	Gabon	1 ↑	2	Liberia
	3	Liberia	1 ↑	3	Uganda
	4	Uganda	1 ↑	4	Gambia
	5	Malawi	=	5	Malawi
	6	Sierra Leone	=	6	Sierra Leone
	7	Zimbabwe	1 ↓	7	Cameroon
	8	Zambia	1 ↓	8	Zimbabwe
	9	Cameroon	2 ↑	9	Zambia
	10	Botswana	1 ↓	10	Kenya
	11	Ghana	1 ↓	11	Botswana
	12	Namibia	1 ↓	12	Ghana
Second	13	Democratic Republic of Congo	1 ↓	13	Namibia
	14	Kenya	4 ↑	14	Democratic Republic of Congo
	15	Tunisia	=	15	Tunisia
	16	Togo	=	16	Togo
	17	Benin	1 ↓	17	Congo, Republic of
	18	Swaziland	1 ↓	18	Benin
	19	Guinea-Bissau	2 ↓	19	Swaziland
	20	Congo, Republic of	3 ↑	20	Morocco
	21	Morocco	1 ↑	21	Guinea-Bissau
	22	Cote d'Ivoire	3 ↓	22	Tanzania
	23	Tanzania	1 ↑	23	Nigeria
	24	Nigeria	1 ↑	24	Mozambique

Table 4.5. *Continued*.

Quartiles	No.	Group 1	Shifts	No.	Group 2
Third	25	Angola	1 ↓	25	Cote d'Ivoire
	26	Mozambique	2 ↑	26	Angola
	27	Equatorial Guinea	=	27	Equatorial Guinea
	28	Senegal	=	28	Senegal
	29	Guinea	=	29	Guinea
	30	Ethiopia	=	30	Ethiopia
	31	Rwanda	=	31	Rwanda
	32	Central African Republic	1 ↓	32	Algeria
	33	Burkina Faso	1 ↓	33	Central African Republic
	34	Algeria	2 ↑	34	Burkina Faso
	35	Egypt	=	35	Egypt
	36	Somalia	1 ↓	36	Mali
Fourth	37	Mali	1 ↑	37	Somalia
	38	Sudan	1 ↓	38	South Sudan
	39	South Sudan	1 ↑	39	Sudan
	40	Chad	=	40	Chad
	41	Djibouti	4 ↓	41	Eritrea
	42	Eritrea	1 ↑	42	Lesotho
	43	Mauritania	4 ↓	43	Burundi
	44	Lesotho	2 ↑	44	Libya
	45	Burundi	2 ↑	45	Djibouti
	46	Niger	=	46	Niger
	47	Libya	3 ↑	47	Mauritania
	48	Western Sahara	=	48	Western Sahara

4. DISCUSSION

4.1 Categorizing the countries with strong data coverage

The countries that have the potential for developing their own DBIs are: Gambia, Gabon, Liberia, Uganda, Malawi, Sierra Leone, Zimbabwe, Zambia, Cameroon, Botswana, Ghana and Namibia (in descending order). They would do this by using the ADBI scores and then translating them into their own national DBI scores, e.g. BT-DBI (Botswana), CR-DBI (Cameroon), GB-DBI (Gabon), LI-DBI (Liberia), NM-DBI (Namibia), UG-DBI (Uganda) and ZI-DBI (Zimbabwe). This would entail introducing three national sub-index scores for each species (i.e. national distribution, threat assessment and habitat sensitivity), as was done with the South African DBI (Samways and Simaika 2016). In short, while the ADBI is a guideline for national DBI potential, for practical freshwater assessment at the political level of a country, there needs to be a combination of global and national values.

Most of the countries in the first two quartiles have >100 recorded species as well as >1 000 recorded individuals within their borders, indicating that these countries have been well explored regardless of their size. However, some countries do have gaps within the spatial spread of their recorded species, some larger than others, that will need more gathering of data in the field to determine whether additional species are found within their borders, e.g. Cameroon, Botswana, Ghana, Liberia and Kenya (Appendix C2). Nonetheless, overall, each of these countries has sufficient-to-excellent data on their dragonfly assemblages, which can provide an assortment of descriptive characteristics regarding the individual country's freshwater habitat types as well as quality. These assorted habitat requirements of the dragonfly species will assist in creating national DBI scores for the individual countries, i.e. the more diverse the assorted freshwater habitats of the individual countries are, the greater the range of scores that can be created. This will also be beneficial for the freshwater managers of the various countries when they assess the conditions of the assorted freshwater ecosystems within their countries.

There are some exceptions, such as Gambia and Tunisia that have <100 recorded species but >1 000 recorded individuals, indicating that these two countries have been fairly well explored regardless of the species range (i.e. Gambia with 75 species and 1 337 recorded individuals; Tunisia with 54 species and 2 444 recorded individuals). On the other hand, the spatial spread of the species within their borders varies, with Gambia being better explored than Tunisia. This indicates a large gap within this country's specimen exploration (Appendix C2), notwithstanding that Tunisia has extensive arid regions where the DBI may not be relevant or feasible. Size of the country also matters, with Gambia only 11 300 km^2 and Tunisia 163 610 km^2, as does the nature of the freshwater habitats

present within the countries, e.g. Gambia mostly has one large river, the Gambia River, with flood plains (Nations Online 2017).

Another exception is Morocco, which has only 60 recorded species but >4 000 recorded individuals, indicating that the information is available for creating a national DBI. However, according to the historic sampling records, Morocco is divided into two countries, Morocco and Western Sahara whose sovereignty is still unresolved (Nations Online 2017). Morocco has been to some extent well explored, but if the section of Western Sahara is taken into account (Appendix C2), Morocco will need more exploration to determine whether any additional species occur within its borders. There are also four countries within the second quartile that have <100 recorded species and <1 000 recorded individuals, and are not as well explored as the other countries within this quartile, i.e. Benin, Guinea-Bissau, Swaziland and Togo (Appendix C2). Three of the four countries (i.e. Guinea-Bissau, Swaziland and Togo) are relatively small (<100 000 km^2), making it possible for them to be better explored depending on the freshwater habitats that are present.

According to the data that are available and the spatial spread of the species within the borders of the first two quartiles, creating national DBI scores are a possibility for these countries. This is further supported by the range of ADBI scores for these 24 countries, i.e. average (ADBI scores 0 to 5) to excellent (ADBI scores 0 to 9) (Appendix C5). The exceptions are Gambia (ADBI scores 0 to 3) and Guinea-Bissau (ADBI scores 0 to 4), with Gambia in particular having been better explored and the national species list probably close to complete. Furthermore, according to Spearman, nine of these 24 countries have sufficient records (in comparison with the South African DBI) to create national DBI scores, i.e. Cameroon; Congo, Republic of; Democratic Republic of Congo; Gabon; Morocco; Tanzania; Tunisia; Zambia and Zimbabwe.

Another characteristic that is also important when assessing the countries for the possibility of creating national DBI scores is the global IUCN/SSC Red List threat statuses that have been established within these countries. The 24 countries in the first two quartiles have a good (Least Concern and Near Threatened) to an excellent (Least Concern to Critically Endangered) range of Red List statuses, while bearing in mind that some countries may not actually have any truly threatened species. The countries with recorded threat statuses that fall within the very high risk categories (i.e. Vulnerable, Endangered and Critically Endangered) will have more opportunities for creating a wider range of national DBI scores, e.g. Uganda, Malawi, Cameroon, Kenya, Tunisia and Morocco. Nonetheless, the countries with recorded threat statuses that fall within the medium risk categories (i.e. Near Threatened) could also create a wide range of national DBIs e.g. Gabon, Zambia, Botswana, Namibia and Congo, Republic of.

4.2 Categorizing the countries with poor data coverage

The countries that cannot develop their own national Dragonfly Biotic Index (DBI) scores at present, due to insufficient data recorded within their borders, are: Somalia, South Sudan, Sudan, Chad, Eritrea, Lesotho, Burundi, Libya, Djibouti, Niger, Mauritania and Western Sahara. Indeed, most of the countries in the third and fourth quartiles have <100 recorded species and <1 000 recorded individuals, indicating that these countries have been poorly explored regardless of their size. This dearth of data is further supported by the huge sampling gaps within the spatial spread of the distribution records of these countries, which indicates that extensive exploration is needed to determine whether additional species occur within their borders, e.g. Burkina Faso, Equatorial Guinea, Libya, Mali, Niger, Rwanda and Senegal (Appendix C2). These poorly explored countries are also species poor due to the extensive arid habitats that occur within these countries, i.e. deserts and xeric shrublands such as the Atlantic Coastal Desert region within Mauritania. Consequently, the countries of the last two quartiles may have insufficient assemblages of dragonfly species and therefore, may not be able to provide an assortment of descriptive characteristics regarding the individual country's freshwater habitat types as well as quality.

There are some exceptions to the general rule, such as Angola that has >100 recorded species and >1 000 recorded individuals, indicating that the country has been fairly well explored. Thus, although the spatial spread of its distribution records is patchy, there should be enough information available for Angola to create its own preliminary national DBI scores. Furthermore, for some countries (i.e. Ethiopia, Algeria and Egypt), the recorded species are <100 while the recorded individuals are >1 000, and although the spread of the distribution records is patchy, the countries have been reasonably well explored, but would benefit considerably from more dragonfly exploration. However, Algeria and Egypt both have extensive arid regions where a national DBI may not be relevant or feasible, except perhaps locally within those countries e.g. along the Nile. Consequently, species with a narrow range of DBI scores will not be as sensitive as those with a wide range, but if there are many recorded species as well as recorded individuals, there would be some compensation when creating national DBI scores.

Moreover, for the most part, the ADBI scores for these 24 countries range from average (ADBI scores 0 to 5) to poor (ADBI scores 0 to 4) making it even more difficult to use the ADBI scores to develop national DBI scores (Appendix C5). The exceptions are Guinea (ADBI scores 0 to 6), Ethiopia (ADBI scores 0 to 9) and Algeria (ADBI scores 0 to 7), with both Algeria and Ethiopia being the better-explored countries. Furthermore, according to Spearman, four of these 24 countries have sufficient records (in comparison with the South African DBI) to create national DBI scores, i.e. Algeria, Angola, Lesotho and Mozambique. However, Lesotho is embedded within the borders of South Africa, which could have influenced this outcome as the same species occur within both

countries. Overall, translating the recorded ADBI scores into national DBI scores within these last 24 countries will be difficult without extensive work on improving their distribution records.

When assessing the countries for the possibility of creating national DBI scores, the global IUCN/SSC Red List threat statuses that have been established within these countries should also be taken into consideration. Most of the 24 countries in the last two quartiles have only the threat status of Least Concern, although some of these countries may not actually have any truly threatened species. However, some countries have threat statuses that fall within the very high risk categories (i.e. Vulnerable, Endangered and Critically Endangered) and will be able to create a wider range of national DBI scores, e.g. Mozambique, Ethiopia and Algeria. There are also countries with recorded threat statuses that fall within the medium risk categories (i.e. Near Threatened) that could create a wide range of national DBIs, e.g. Angola, Guinea, Rwanda, Sudan and Niger.

4.3 Potential adjustments to the ADBI calculations

There are potential adjustments as to how the three ADBI sub-index scores for the dragonfly species can be calculated so as to be able to calculate national DBI scores. An important focus would be to undertake a national Red List threat assessments of the species in each country, particularly for the high risk threat statuses, i.e. Vulnerable (VU), Endangered (EN) and Critically Endangered (CR). It is important to have national Red List threat statuses as they give a good indication of the level of threat to species at the local scale. This is particularly important, as some species may be seen as rare within their distribution range of a political entity (such as a country) and therefore, can be classified as being highly threatened within this range. Yet, the same species may occur at a wider range elsewhere (i.e. common) and may not necessarily be threatened at a global level.

Another adjustment would be to the distribution of the species within a country, i.e. some of the species may occur across a wide distribution range within Africa, but may only occur just over the border of a particular country, or may have a spotty distribution within that country. So, these species could be potentially scored as species with a narrow or very narrow distribution range size within these countries, i.e. they would receive higher distribution sub-index scores. Finally, and perhaps the most important adjustment, would be to use the habitat sensitivity sub-index of the South African DBI (or something similar to this index) instead of the species vulnerability sub-index to calculate the third sub-index on the African countries' national DBI scores. The reason for this is that, although the vulnerability ADBI sub-index is useful, it is subjective. This is a contrast with the habitat sub-index of the South African DBI which is objective, i.e. how many records of a species are in disturbed or transformed habitats as opposed to those from fully natural habitat.

5. CONCLUSION

The African Dragonfly Biotic Index (ADBI) was created to assist freshwater managers with conservation planning that may preserve or restore the different freshwater ecosystems within Africa. However, conservation planning is typically based on conservation-action units, which can be heavily influenced by the political boundaries of those countries. Evaluating the data of each of the 48 African countries (i.e. distribution range, extent of Red List threat statuses and ADBI range) provided some insight into which countries have the necessary data available to create their own national Dragonfly Biotic Indices (DBIs) and those that are not. Thus, the null hypothesis (i.e. each African country (48) has an equal opportunity to create national DBI scores), is rejected. Also, some countries are perhaps not well-suited for creating their own national DBIs due to being overall too arid (e.g. Egypt, Algeria and Morocco; but could develop local DBIs in their wetter zones). Others may not have diverse enough species assemblages that could provide the necessary assorted habitat requirements that will assist potential freshwater managers in creating a wide range of national DBI scores. However, on a whole, data are available for most of the African countries to start creating potential national DBIs. This could be particularly important for future species/habitat conservation as anthropogenic impacts increases in severity.

REFERENCES

Chovanec, A. 2000. Dragonflies (Insecta: Odonata) as indicators of the ecological integrity of aquatic systems – a new assessment approach. *Verhandlungen des Internationalen Verein Limnologie* **27**: 887-890.

Chovanec, A., Schindler, M, Waringer, J. and Wimmer, R. 2015. The Dragonfly Association Index (Insecta: Odonata) – A tool for the type-specific assessment of lowland rivers. *River Research and Applications* **31**: 627-638.

Clark, T.E. and Samways, M.J. 1996. Dragonflies (Odonata) as indicators of biotope quality in the Kruger National Park, South Africa. *Journal of Applied Ecology* **33**: 1001-1012.

Clausnitzer, V., Dijkstra, K.-D.B., Koch, R., Boudot, J.-P., Darwall, W.R.T., Kipping, J., Samraoui, B., Samways, M.J., Simaika, J.P. and Suhling, F. 2012. Focus on African freshwaters: hotspots of dragonfly diversity and conservation concerns. *Frontiers in Ecology and the Environment* **10**: 129-134.

Corbet, P.S. 1999. *Dragonflies: Behaviour and Ecology of Odonata*. Harley Books, Colchester, UK.

Darwall, W.R.T., Smith, K.G., Allen, D.J., Holland, R.A., Harrison, I.J. and Brooks, E.G.E. (eds.). 2011. *The Diversity of Life in African Freshwaters: Under Water, Under Threat. An analysis of the status and distribution of freshwater species throughout mainland Africa.* IUCN, Cambridge, UK and Gland, Switzerland.

Dell Inc. 2016. *Dell STATISTICA (data analysis software system)*, version 13. www.statsoft.com.

De Olieveira-Junior, J.M.B., Shimano, Y., Gardner, T.A., Hughes, R.M., De Marco Júnior, P. and Juen, L. 2015. Neotropical dragonflies (Insecta: Odonata) as indicators of ecological condition of small streams in the eastern Amazon. *Austral Ecology* **40**: 733-744.

Dijkstra, K.-D.B., Boudot, J.-P., Clausnitzer, V., Kipping, J., Kisakye, J.J., Ogbogu, S.S., Samraoui, B., Samways, M.J., Schütte, K., Simaika, J.P., Suhling, F. and Tchibozo, S.L. 2011. Dragonflies and damselflies of Africa (Odonata): history, diversity, distribution, and conservation. In: W.R.T Darwall, K.G. Smith, D.J. Allen, R.A. Holland, I.J. Harrison and E.G.E Brooks (eds.), *The Diversity of Life in African Freshwaters: Under Water, Under Threat. An analysis of the status and distribution of freshwater species throughout mainland Africa*, pp. 126-177. IUCN, Cambridge, UK and Gland, Switzerland.

Dijkstra, K.-D.B. and Clausnitzer, V. 2014. *The dragonflies and damselflies of Eastern Africa. Handbook for all Odonata from Sudan to Zimbabwe*. Studies in Afrotropical Zoology, vol. 298. Royal Museum for Central Africa, Tervuren, Belgium.

Dudgeon, D., Arthington, A.H., Gessner, M.O., Kawabata, Z.-I., Knowler, D.J., Lévêque, C., Naiman, R.J., Prieur-Richard, A.-H., Soto, D., Stiassny, M.L.J. and Sullivan, C.A. 2006.

Freshwater biodiversity: importance, threats, status and conservation challenges. *Biological Reviews* **81**: 163-182.

Dutra, S. and De Marco, P. 2015. Bionomic differences in odonates and their influence on the efficiency of indicator species of environmental quality. *Ecological Indicators* **49**: 132-142.

ESRI (Environmental Systems Resource Institute). 2010. *ArcMap 10.0*. ESRI Inc., Redlands, California, USA.

Foote, A.L. and Hornung, C.L.R. 2005. Odonates as biological indicators of grazing effects on Canadian prairie wetlands. *Ecological Entomology* **30**: 273-283.

Golfieri, B., Hardersen, S., Maiolini, B. and Surian, N. 2016. Odonates as indicators of the ecological integrity of the river corridor: Development and application of the Odonate River Index (ORI) in northern Italy. *Ecological Indicators* **61**: 234-247.

IUCN (International Union for Conservation of Nature and Natural Resources). 2016. *IUCN Red List Categories and Criteria: Version 3.1*. Second edition. IUCN, Gland, Switzerland and Cambridge, UK.

Kalkman, V.J., Clausnitzer, V., Dijkstra, K.-D.B., Orr, A.G., Paulson, D.R. and Van Tol, J. 2008. Global diversity of dragonflies (Odonata) in freshwater. *Hydrobiologia* **595**: 351-363.

Kietzka, G.J., Pryke, J.S. and Samways, M.J. 2017. Aerial adult dragonflies are highly sensitive to in-water conditions across an ancient landscape. *Diversity and Distributions* **23**: 14-26.

Kipping, J., Dijkstra, K.-D.B., Clausnitzer, V., Suhling, F. and Schütte, K. 2009. Odonata Database of Africa (ODA). *Agrion* **13**: 20-23.

Kutcher, T.E. and Bried, J.T. 2014. Adult Odonata conservatism as an indicator of freshwater wetland condition. *Ecological Indicators* **38**: 31-39.

Martín, R. and Maynou, X. 2016. Dragonflies (Insecta: Odonata) as indicators of habitat quality in Mediterranean streams and rivers in the province of Barcelona (Catalonia, Iberian Peninsula). *International Journal of Odonatology* **19**: 107-124.

Nations Online. 2017. *Africa*. Available at: http://www.nationsonline.org/oneworld/africa.htm.

Oertli, B. 2008. The use of dragonflies in the assessment and monitoring of aquatic habitats. In: A. Córdoba-Aguilar (ed.), *Dragonflies and Damselflies: Model organisms for Ecological and Evolutionary Research*, pp. 79-95. Oxford University Press, Oxford.

Revenga, C., Campbell, I., Abell, R., De Villiers, P. and Bryer, M. 2005. Prospects for monitoring freshwater ecosystems towards the 2010 Targets. *Philosophical Transactions of the Royal Society: Biological Sciences* **360**: 397-413.

Samways, M.J. 2005. Dragonflies: sensitive indicators of freshwater health. In: M.L. Thieme, R. Abell, M.L.J. Stiassny, P. Skelton, B. Lehner, G.G. Teugels, E. Dinerstein, A.K. Toham, N.

Burgess and D. Olson (eds.), *Freshwater Ecoregions of Africa and Madagascar: A conservation assessment*, pp. 19-21. Island Press, Washington DC, USA.

Samways, M.J. and Simaika, J.P. 2016. *Manual of Freshwater Assessment for South Africa: Dragonfly Biotic Index*. *Suricata* 2. South African National Biodiversity Institute, Pretoria, South Africa.

Samways, M.J. and Steytler, N.S. 1996. Dragonfly (Odonata) distribution patterns in urban and forest landscapes, and recommendations for riparian management. *Biological Conservation* **78**: 279-288.

Samways, M.J. and Taylor, S. 2004. Impacts of invasive alien plants on Red-listed South African dragonflies (Odonata). *South African Journal of Science* **100**: 78-80.

Shumway, C.A. 1999. *Forgotten waters: Freshwater and marine ecosystems in Africa*. Strategies for biodiversity conservation and sustainable development. Boston University, Boston, USA.

Silva, D. de paiva, De Marco, P. and Resende, D.C. 2010. Adult odonate abundance and community assemblage measures as indicators of stream ecological integrity: A case study. *Ecological Indicators* **10**: 744-752.

Simaika, J.P. and Samways, M. J. 2009. An easy-to-use index of ecological integrity for prioritizing freshwater sites and for assessing habitat quality. *Biodiversity and Conservation* **18**: 1171-1185.

Simaika, J.P. and Samways, M.J. 2011. Comparative assessment of indices of freshwater habitat conditions using different invertebrate taxon sets. *Ecological Indicators* **11**: 370-378.

Simaika, J.P. and Samways, M.J. 2012. Using dragonflies to monitor and prioritize lotic systems: a South African perspective. *Organisms, Diversity and Evolution* **12**: 251-259.

Simaika, J.P., Samways, M.J., Kipping, J., Suhling, F., Dijkstra, K.-D.B., Clausnitzer, V., Boudot, J.-P. and Domisch, S. 2013. Continental-scale conservation prioritization of African dragonflies. *Biological Conservation* **157**: 245-254.

Smith, J., Samways, M.J. and Taylor, S. 2007. Assessing riparian quality using two complementary sets of bioindicators. *Biodiversity and Conservation* **16**: 2695-2713.

Strayer, D.L. and Dudgeon, D. 2010. Freshwater biodiversity conservation: recent progress and future challenges. *Journal of the North American Benthological Society* **29**: 344-358.

UNEP (United Nations Environment Programme) and AMCEN Secretariat. 2002. *Africa environment outlook: past, present, and future perspectives*. Earthprint for and on behalf of the United Nations Environment Programme, Stevenage, Hertfordshire.

Valente-Neto, F., Roque, F. de Oliveira, Rodrigues, M.E., Juen, L. and Swan, C.M. 2016. Toward a practical use of Neotropical odonates as bioindicators: Testing congruence across taxonomic resolution and life stages. *Ecological Indicators* **61**: 952-959.

Vörösmarty, C.J., McIntyre, P.B., Gessner, M.O., Dudgeon, D., Prusevich, A., Green, P., Glidden, S., Bunn, S.E., Sullivan, C.A., Reidy Liermann, C. and Davies, P.M. 2010. Global threats to human water security and river biodiversity. *Nature* **467**: 555-561.

APPENDIX C1: Description of the African Dragonfly Biotic Index (ADBI) sub-indices.

Descriptions of the three sub-indices of the African Dragonfly Biotic Index, i.e. 1) Geographical Distribution, 2) Threat Status, and 3) Species Vulnerability to anthropogenic disturbances (see Chapter 2 for the calculations). The scores of each sub-index range from 0 to 3, with the total ADBI score being the sum of the scores of the three sub-indices, which ranges from 0 to 9. Thus, a common, widespread, non-threatened and highly-tolerant (of anthropogenic disturbances) species would receive a score of 0 (0 + 0 + 0), whereas a highly restricted, Endangered and extremely sensitive species would be scored a 9 (3 + 3 + 3). Abbreviations for the IUCN/SSC Red List threat status (IUCN 2016): LC – Least Concern, NT – Near Threatened, DD – Data Deficient, VU – Vulnerable, EN – Endangered and CR – Critically Endangered. Other abbreviations: lat-long – latitude-longitude.

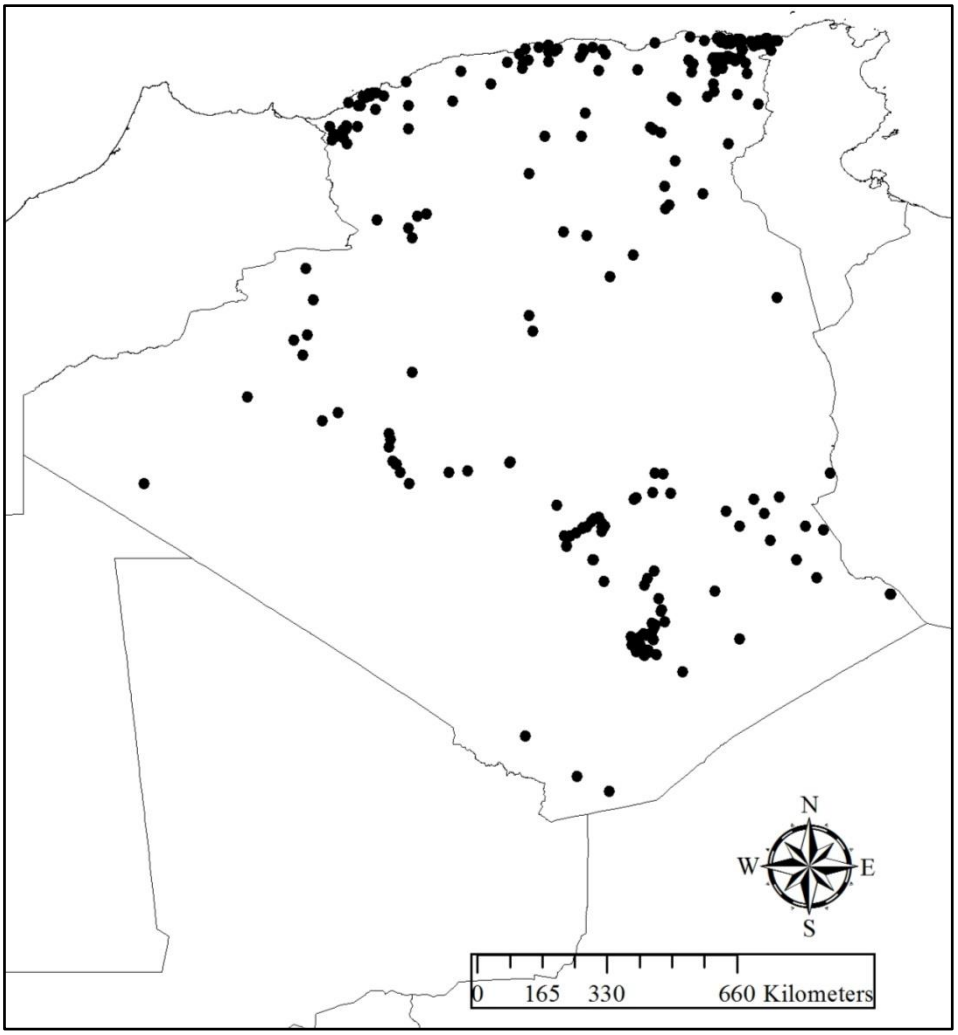
Scores	Sub-indices		
	Geographical Distribution	**Threat Status**	**Species Vulnerability**
0	A very wide distribution range size (species have a lat-long range size of more than 50° of continental Africa)	LC	Low vulnerability to certain anthropogenic disturbances (all 3 habitat types* are disturbed)
1	A wide distribution range size (species have a lat-long range size between 25° and 50° of continental Africa)	NT, DD	Shows some vulnerability to certain anthropogenic disturbances (2 habitat types* are disturbed)
2	A narrow distribution range size (species have a lat-long range size between 5° and 25° of continental Africa)	VU	Is vulnerable to certain anthropogenic disturbances (1 habitat type* is disturbed)
3	A very narrow distribution range size (species have a lat-long range size of less than 5° of continental Africa)	EN, CR	Extremely vulnerable to certain anthropogenic disturbances (no habitat type* is disturbed)

*The habitat types include the occurrence of landscape, water bodies and microhabitats (see Chapter 2).

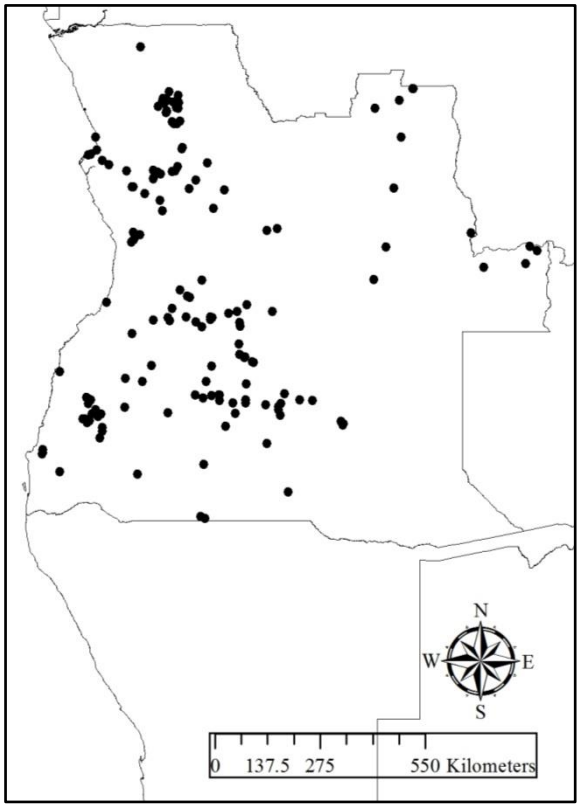
APPENDIX C2: The spatial spread of the dragonfly species recorded in the 48 African countries.

Maps of the 48 African countries illustrating the spatial spread of the dragonfly species recorded within each country (i.e. each record is represented by a dot). Included, are the number of species and the number of individuals recorded for each country, which were obtained from the Odonata Database of Africa (Kipping *et al.* 2009). Also included, are the relevant sizes (km^2) of the various countries (Nations Online 2017, which is used by United Nations when geographic sub-regions are categorized). Excluded is a map of the South Africa distribution records, as the country already has a national Dragonfly Biotic Index. The names of the dragonfly species recorded within each country are listed in Appendix C3.

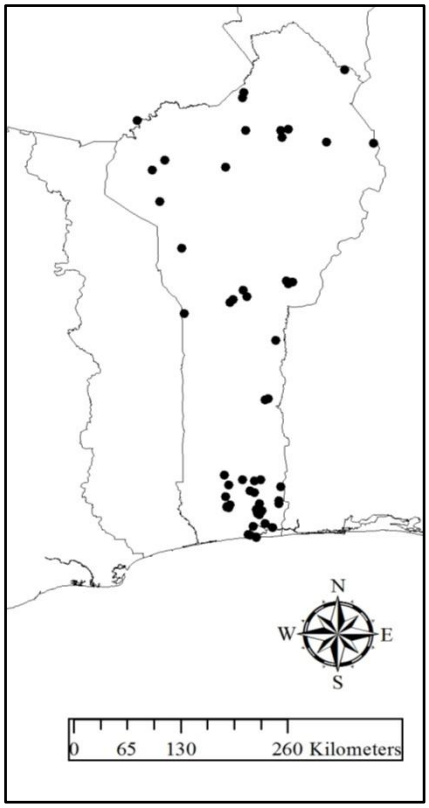
Algeria: (2 380 000 km^2, 60 species, 1 934 records)



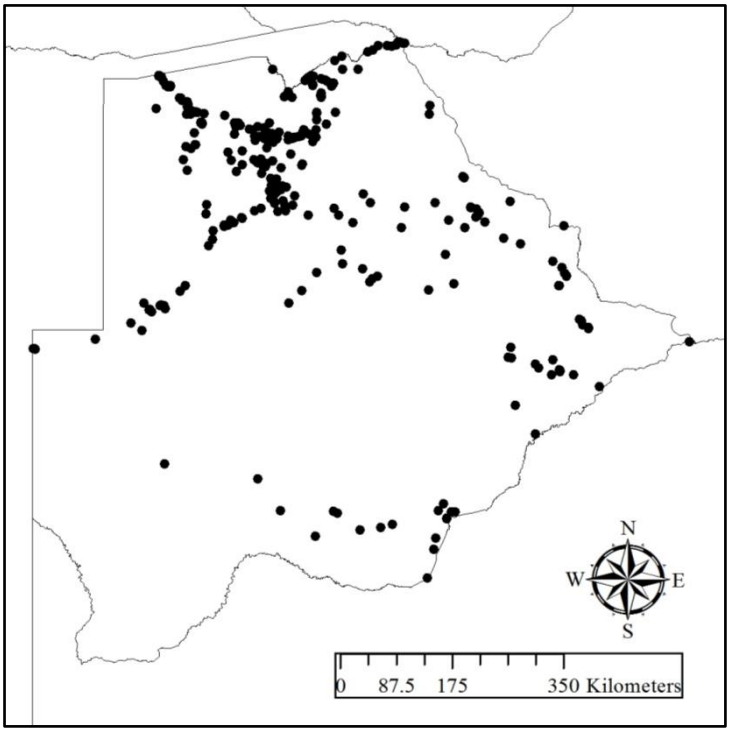
Angola: (1 246 700 km^2, 195 species, 2 181 records)



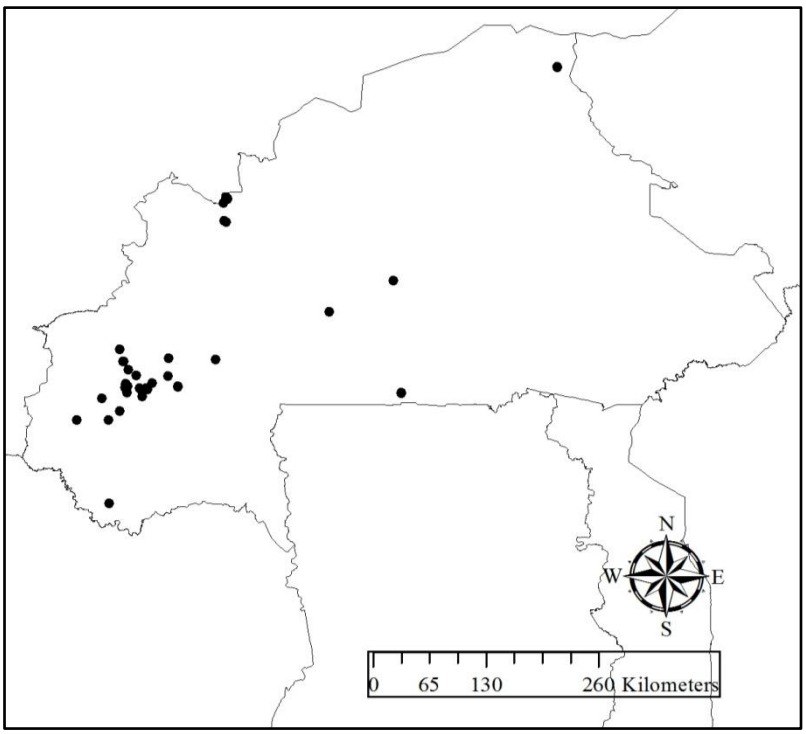
Benin: (112 622 km^2, 92 species, 887 records)



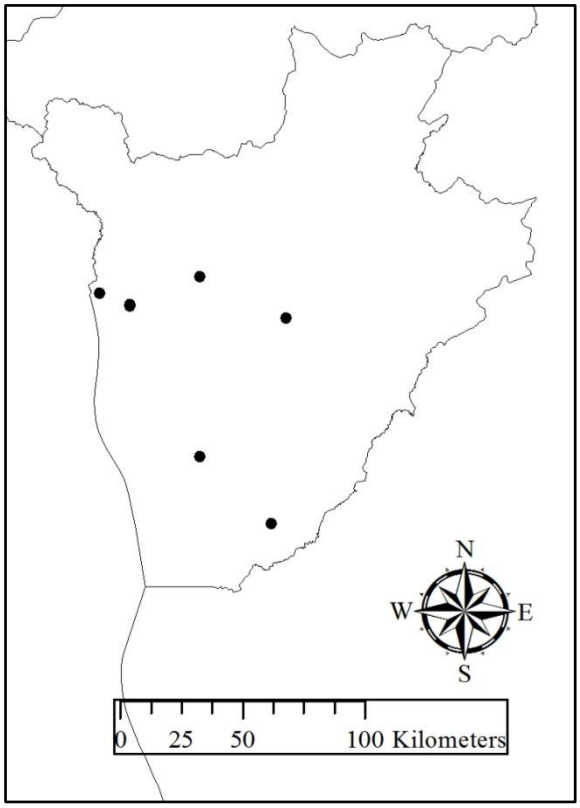
Botswana: (582 000 km^2, 120 species, 6 566 records)



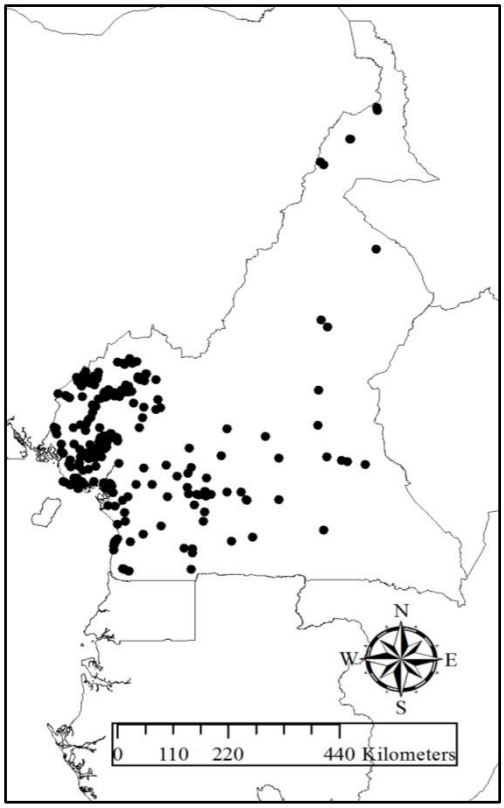
Burkina Faso: (274 222 km^2, 59 species, 269 records)



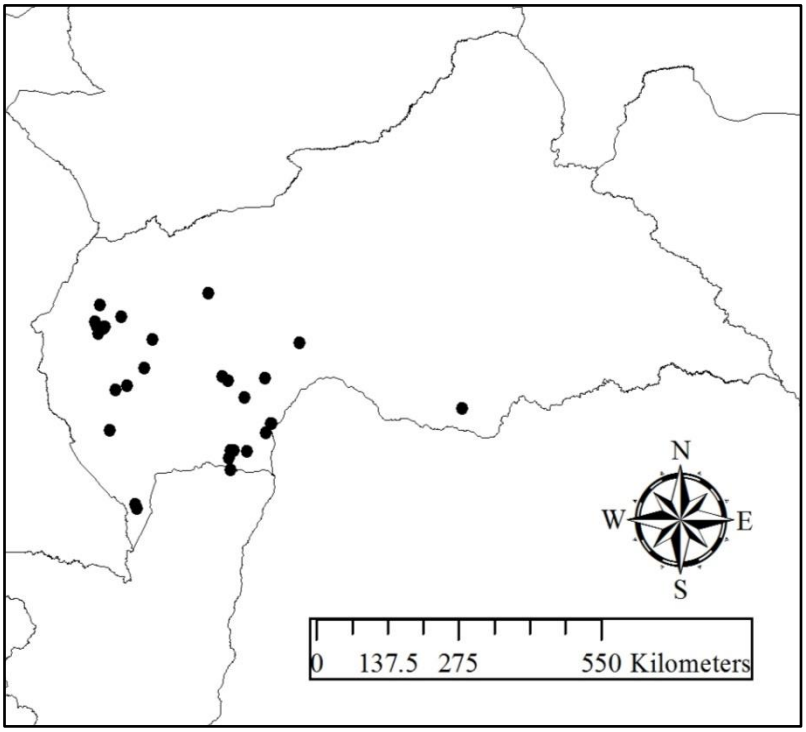
Burundi: (27 834 km^2, 11 species, 13 records)



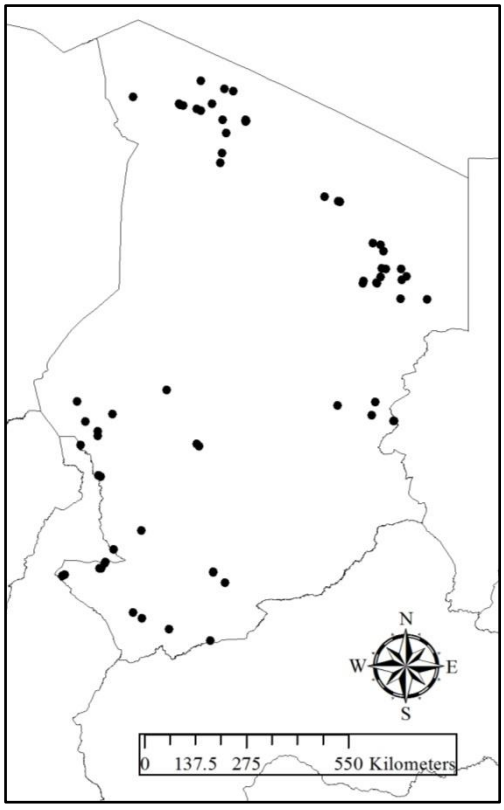
Cameroon: (475 650 km^2, 213 species, 3 341 records)



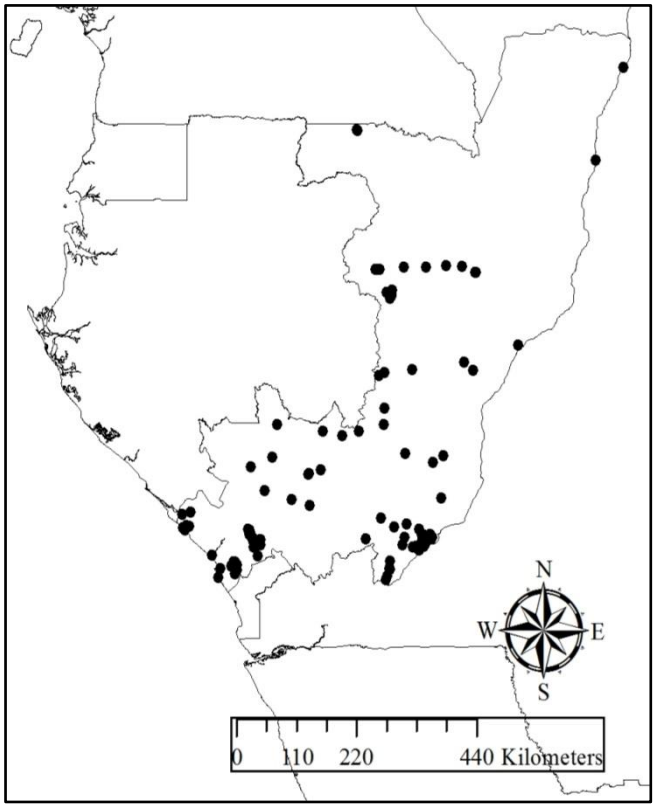
Central African Republic: (622 984 km^2, 105 species, 385 records)



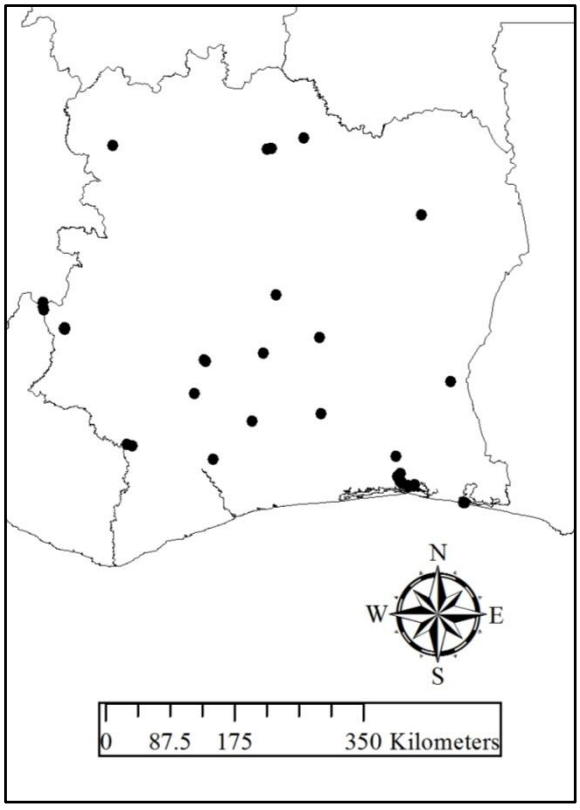
Chad: (1 284 000 km^2, 45 species, 251 records)



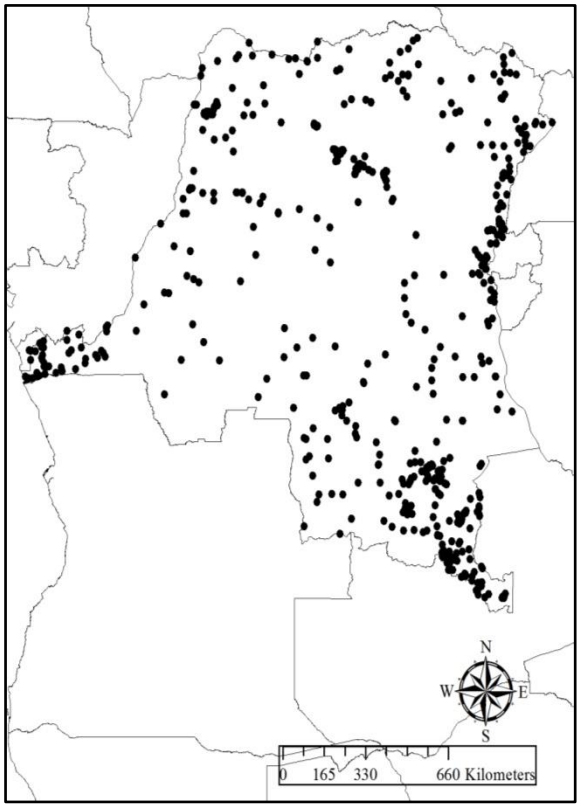
Congo, Republic of: (342 000 km^2, 156 species, 1 432 records)



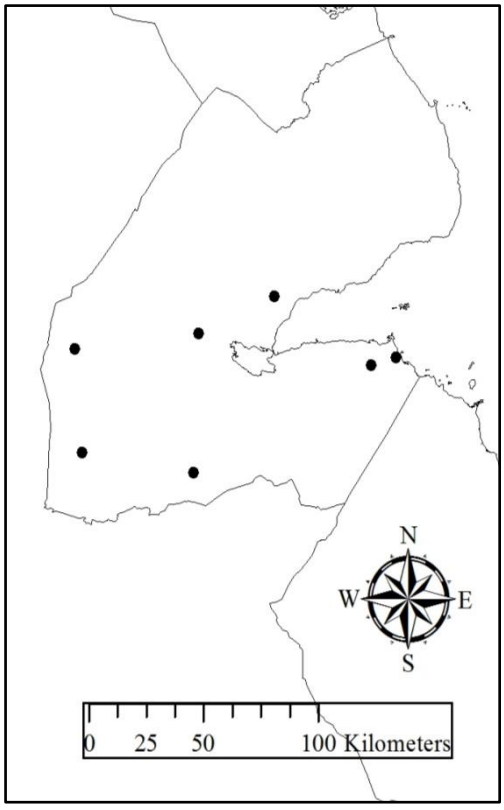
Cote d'Ivoire: (322 463 km^2, 152 species, 785 records)



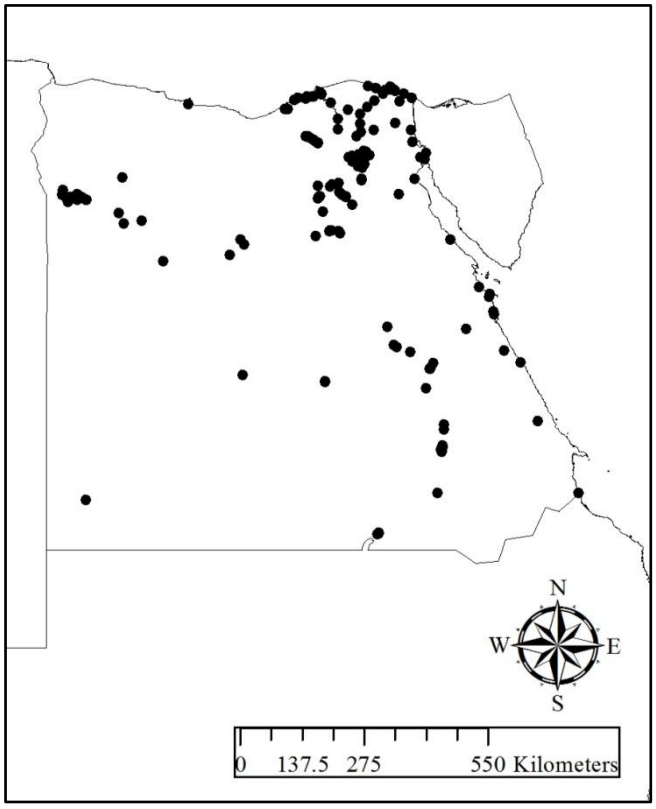
Democratic Republic of Congo: (2 344 858 km^2, 332 species, 6 044 records)



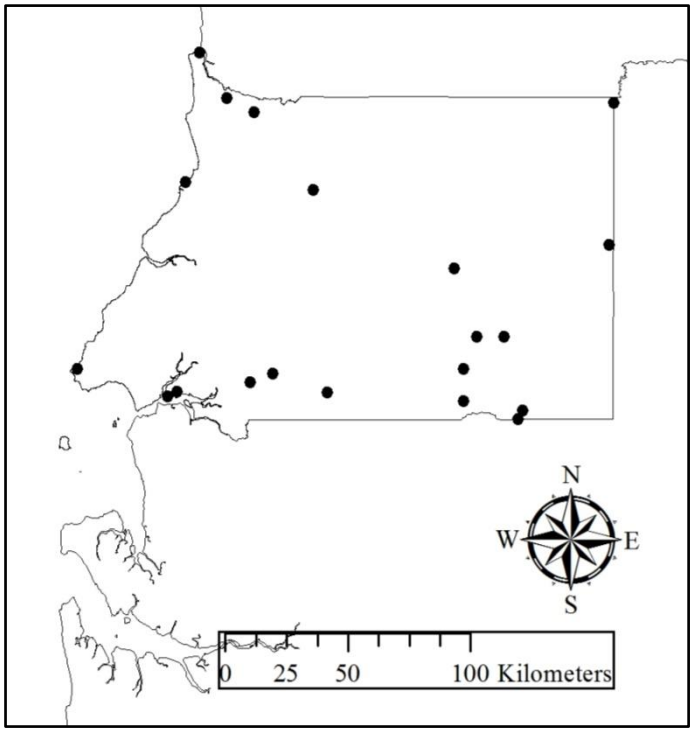
Djibouti: (23 200 km^2, 8 species, 20 records)



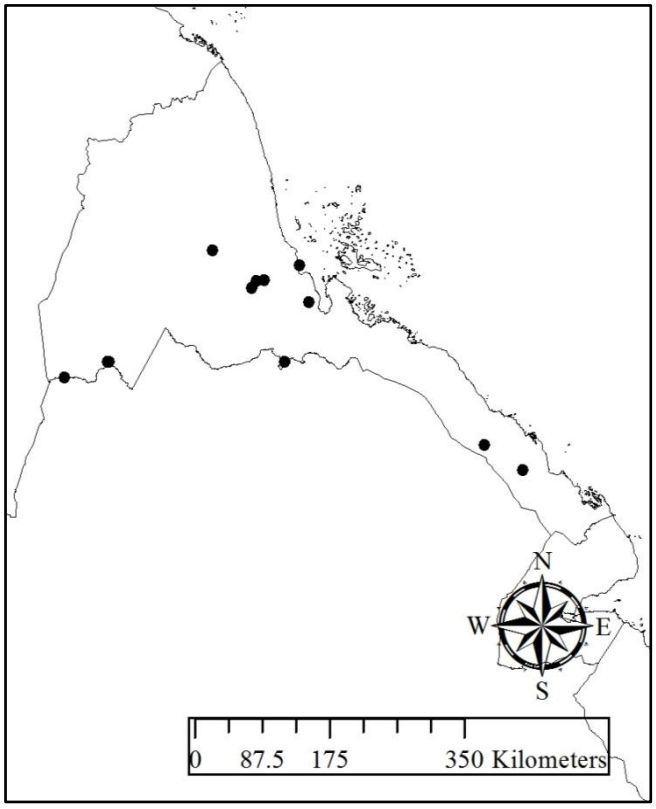
Egypt: (1 000 000 km^2, 32 species, 1 211 records)



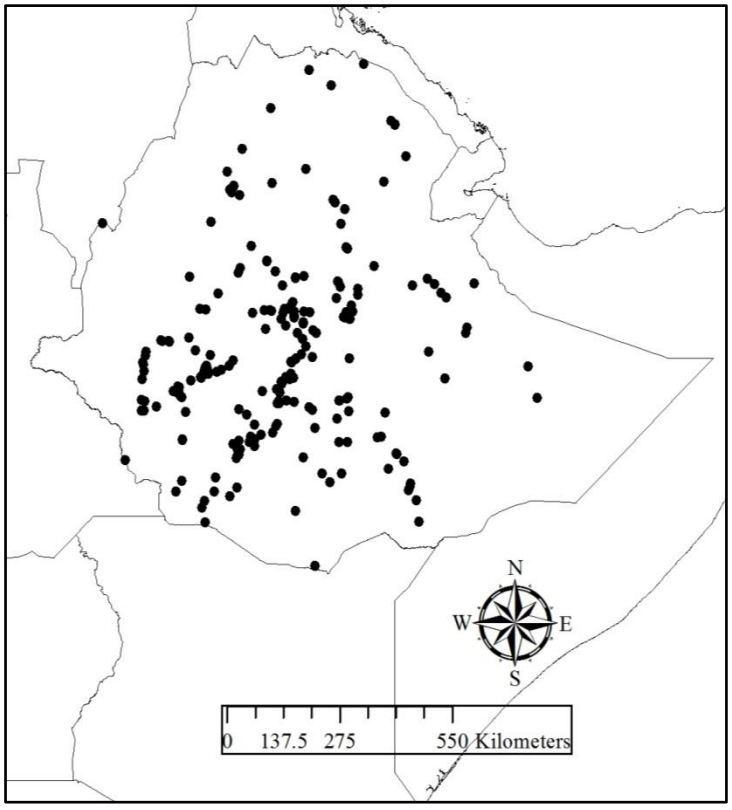
Equatorial Guinea: (28 000 km^2, 69 species, 108 records)



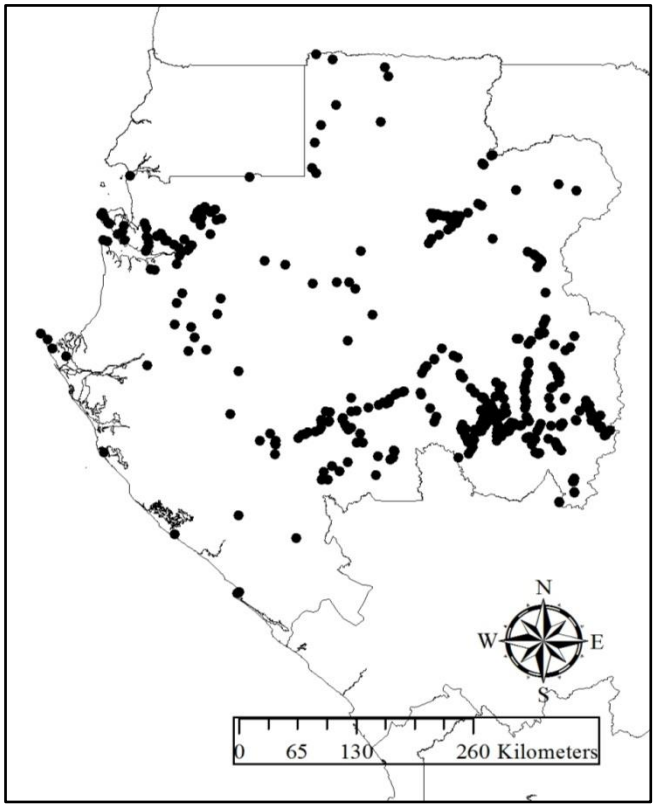
Eritrea: (117 600 km^2, 20 species, 35 records)



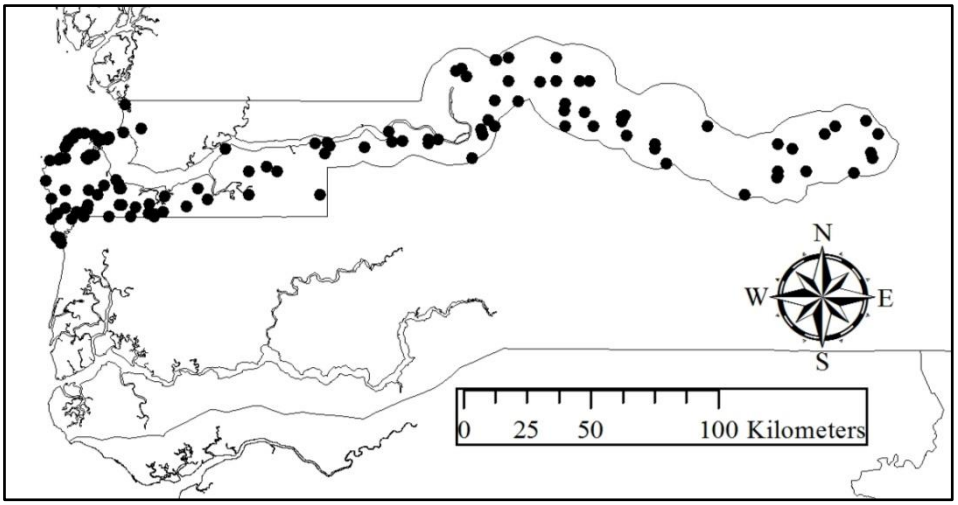
Ethiopia: (1 126 829 km^2, 99 species, 1 000 records)



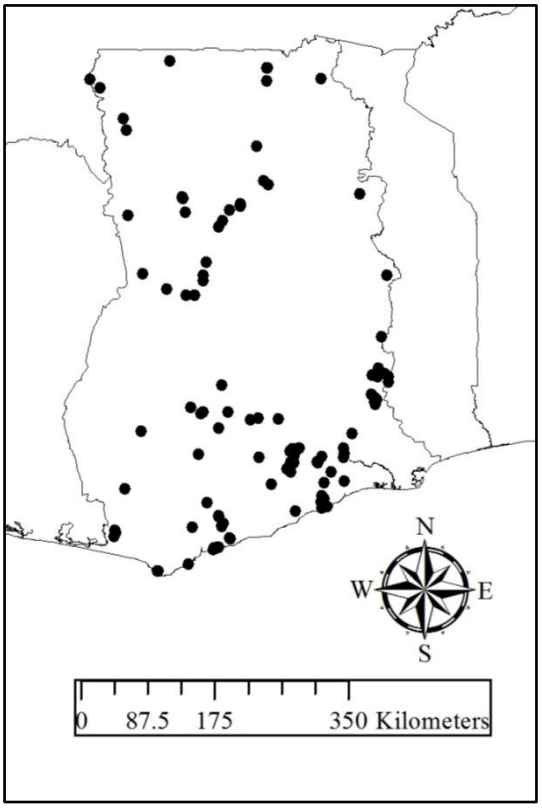
Gabon: (267 668 km^2, 223 species, 9 973 records)



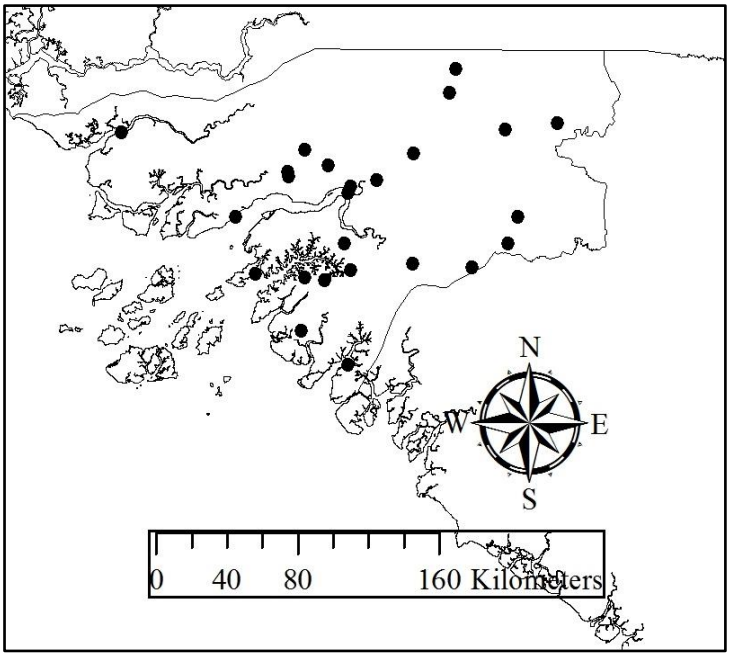
Gambia: (11 300 km^2, 75 species, 1 337 records)



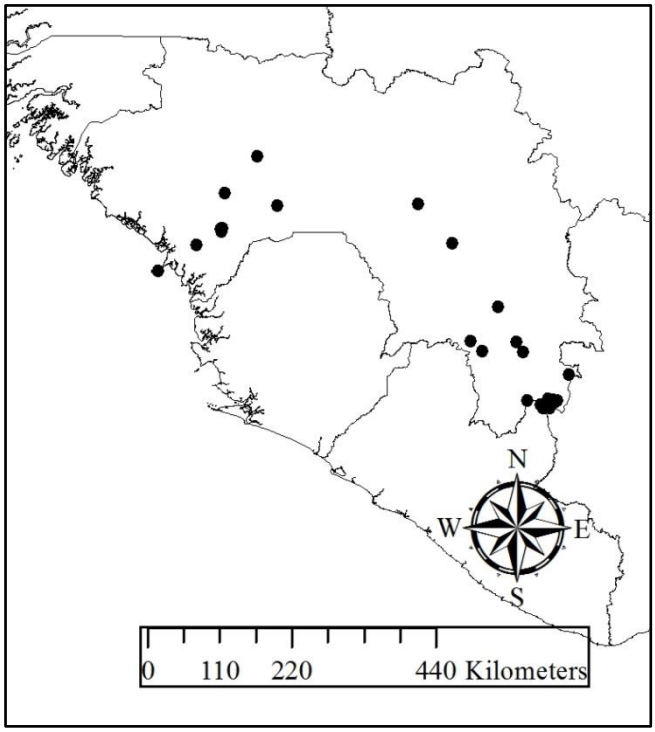
Ghana: (238 391 km^2, 167 species, 1 900 records)



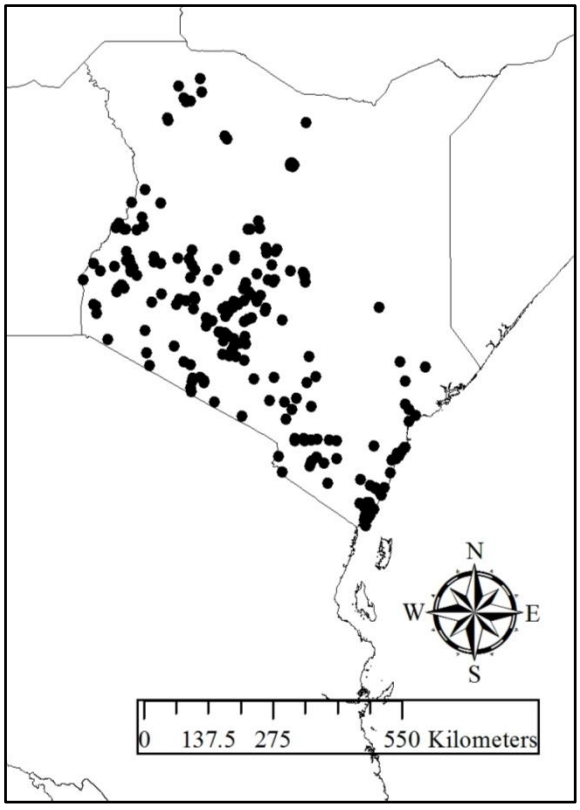
Guinea-Bissau: (36 000 km^2, 64 species, 393 records)



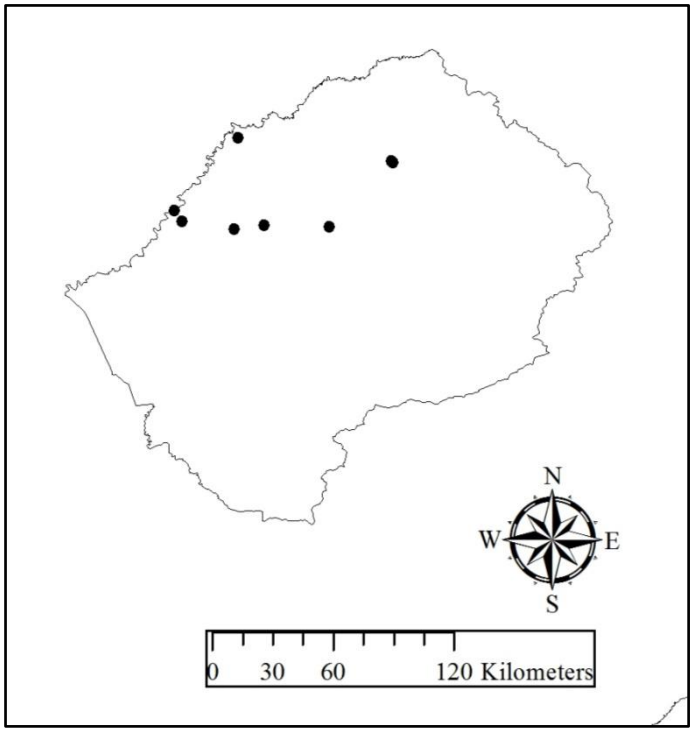
Guinea: (245 857 km^2, 107 species, 431 records)



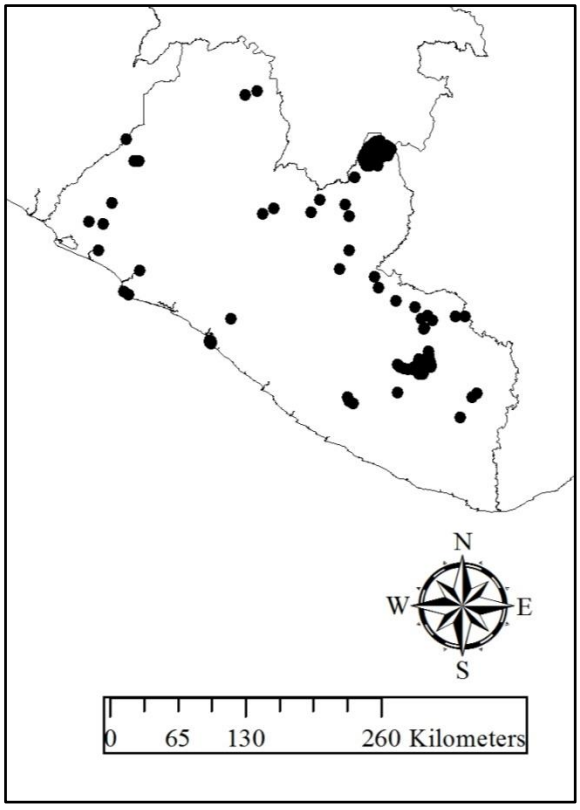
Kenya: (580 000 km^2, 163 species, 2 918 records)



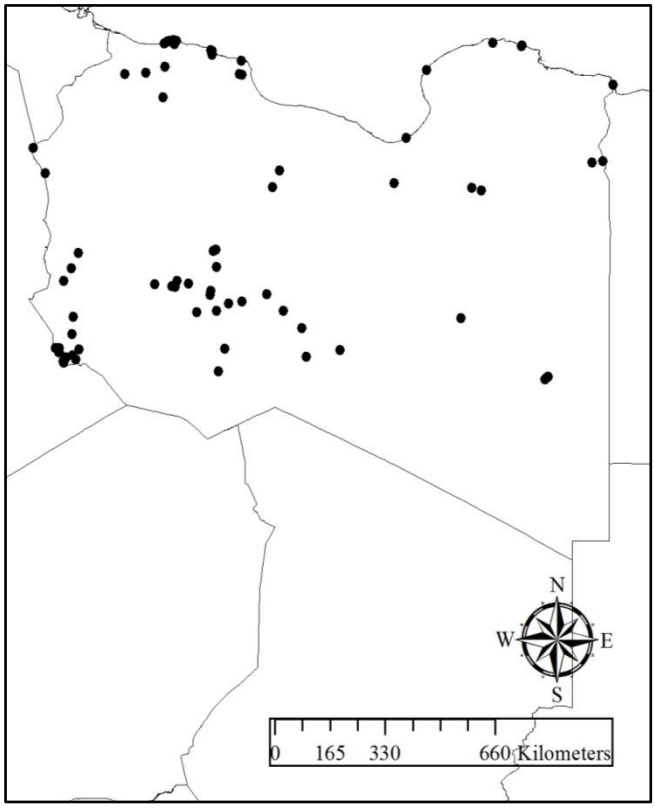
Lesotho: (30 355 km^2, 12 species, 15 records)



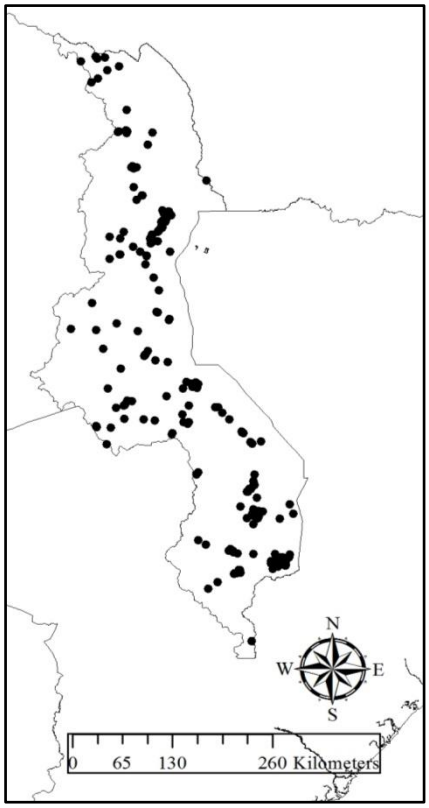
Liberia: (111 369 km^2, 185 species, 4 054 records)



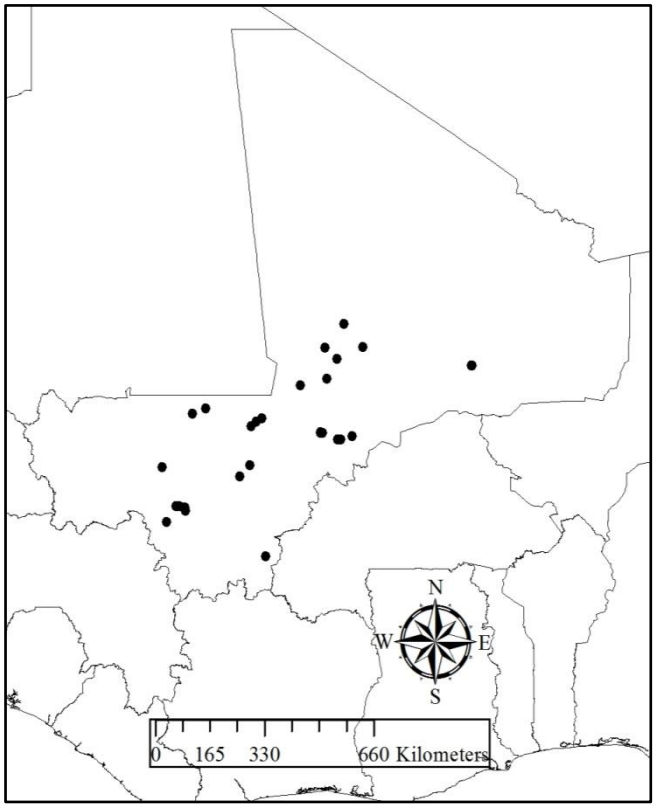
Libya: (1 759 540 km^2, 28 species, 309 records)



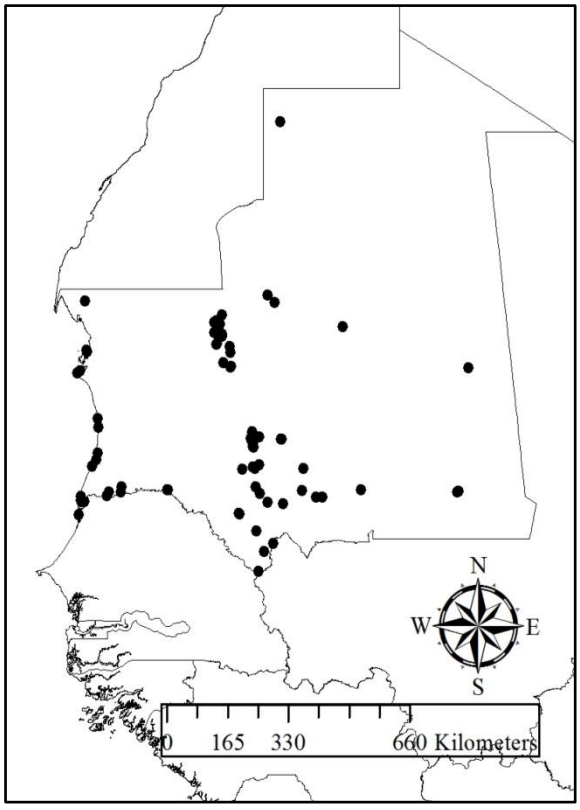
Malawi: (118 484 km^2, 144 species, 2 727 records)



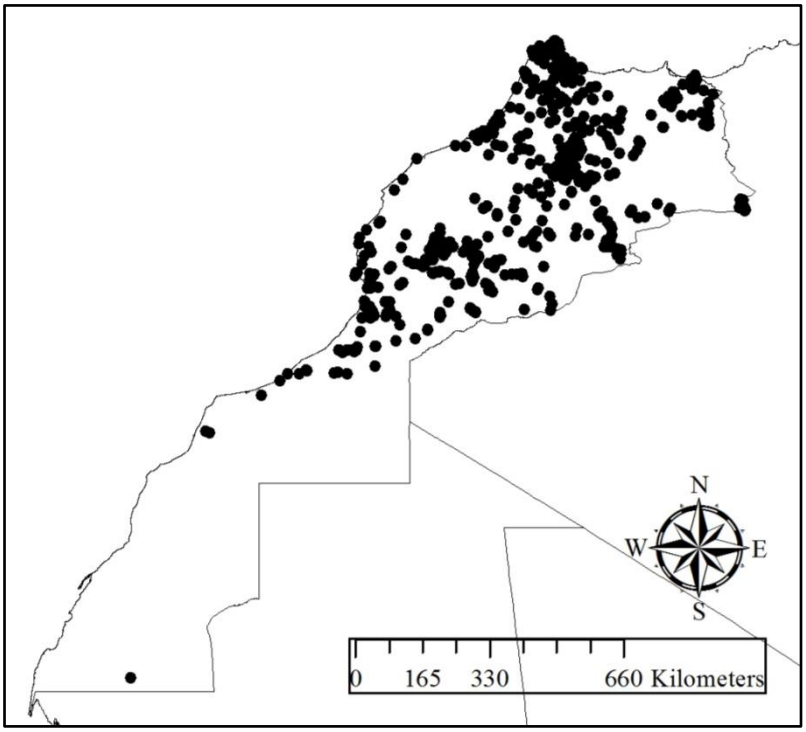
Mali: (1 241 238 km^2, 71 species, 416 records)



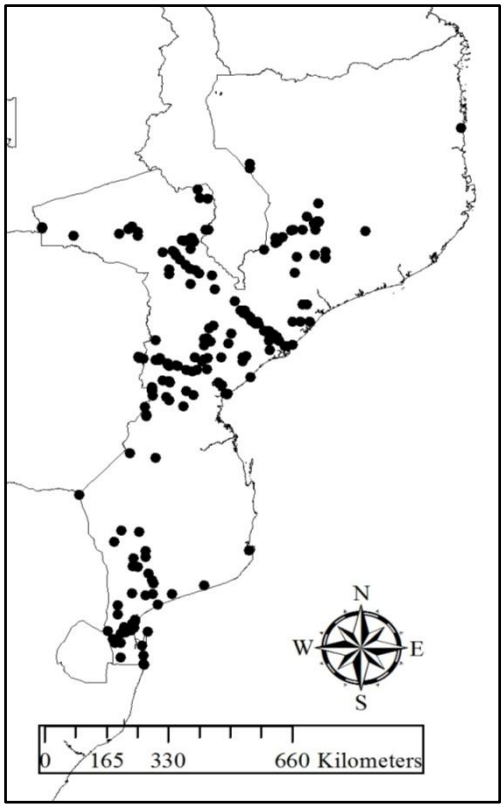
Mauritania: (1 030 000 km^2, 24 species, 255 records)



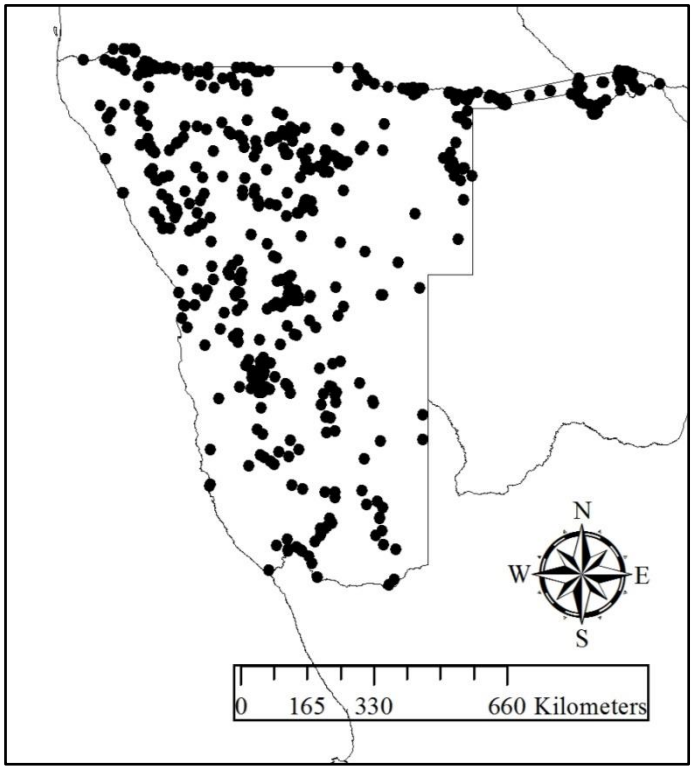
Morocco: (446 550 km^2, 60 species, 4 188 records)



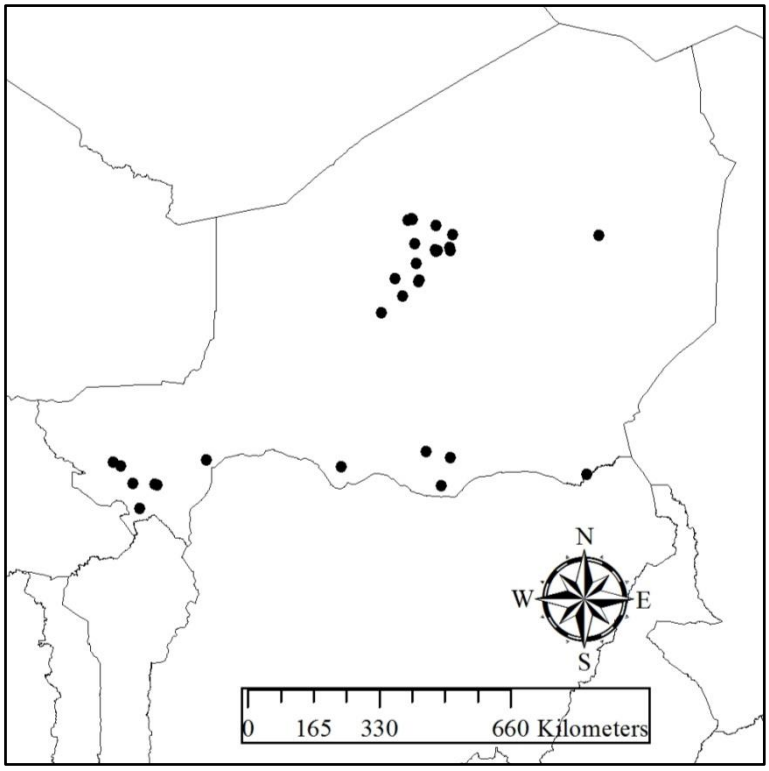
Mozambique: (801 590 km^2, 137 species, 1 956 records)



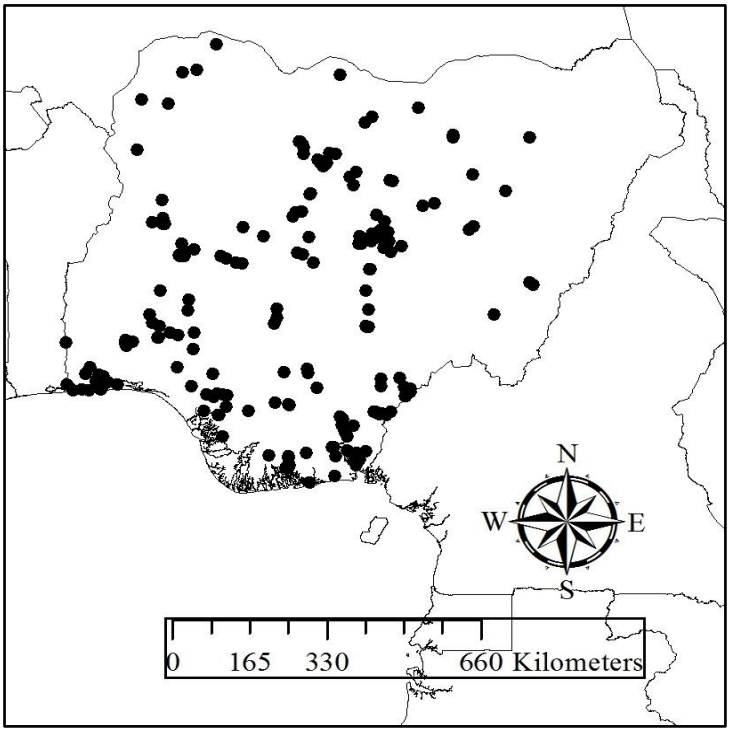
Namibia: (824 292 km^2, 124 species, 8 024 records)



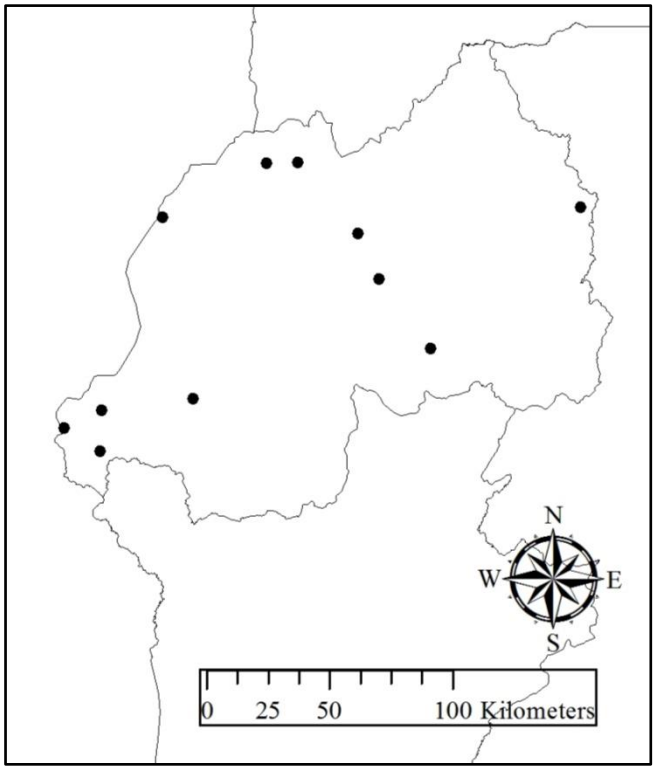
Niger: (1 267 000 km^2, 30 species, 215 records)



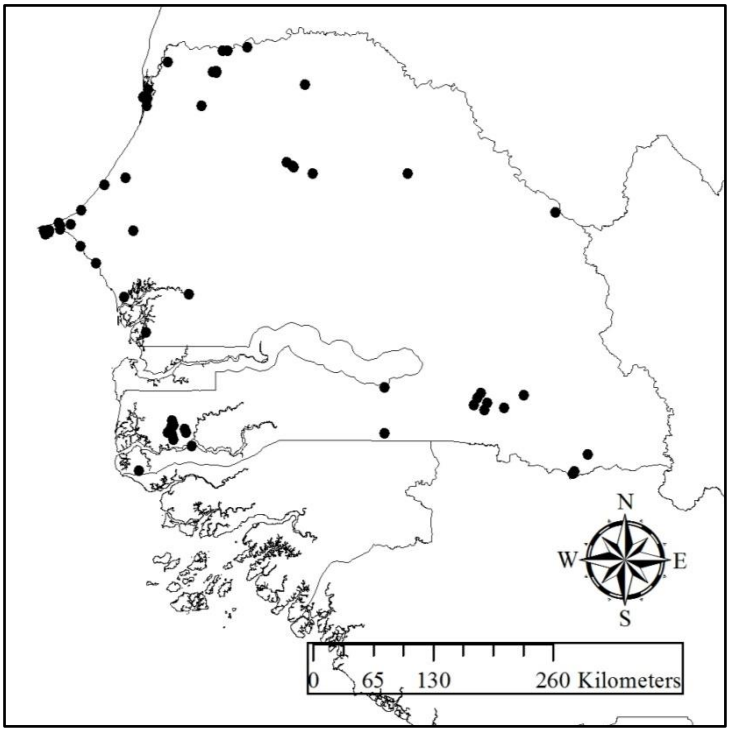
Nigeria: (923 768 km^2, 203 species, 1 606 records)



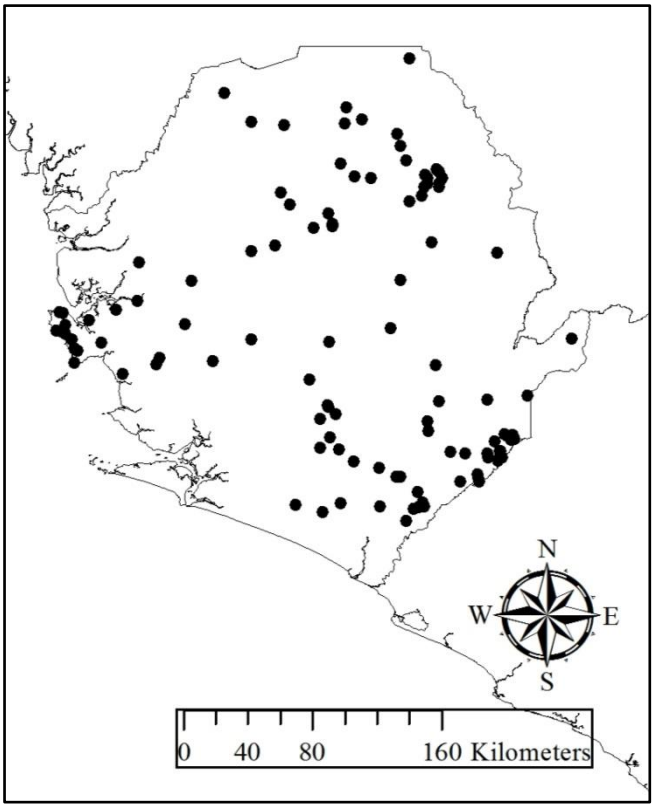
Rwanda: (26 338 km^2, 41 species, 50 records)



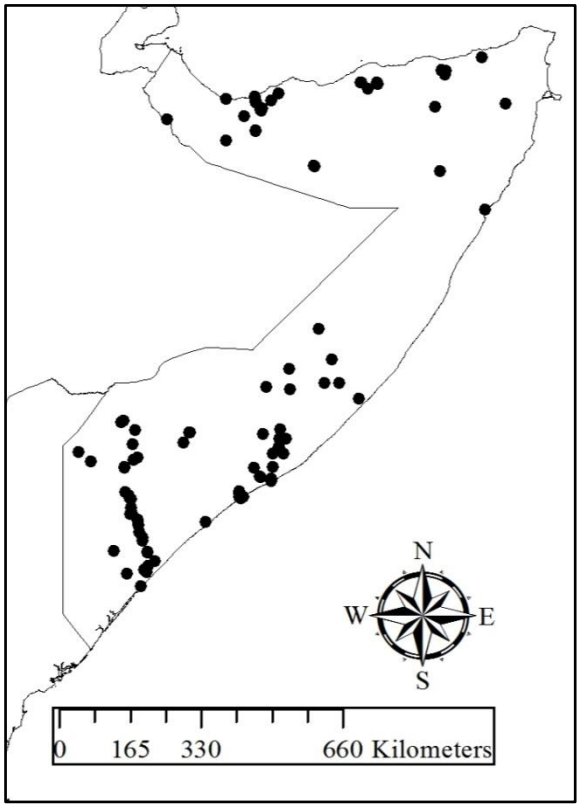
Senegal: (196 722 km^2, 66 species, 671 records)



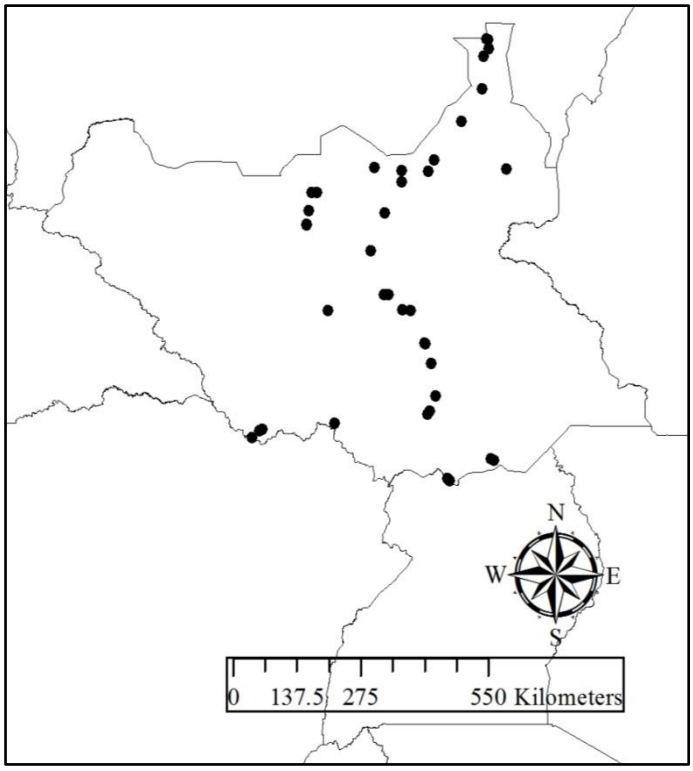
Sierra Leone: (71 740 km^2, 155 species, 1 332 records)



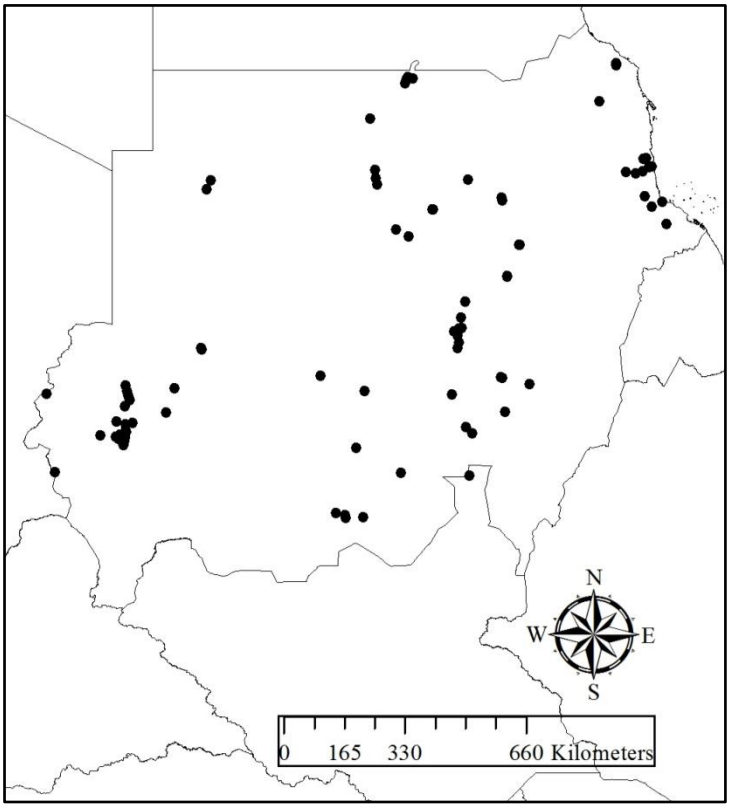
Somalia: (637 657 km^2, 55 species, 371 records)



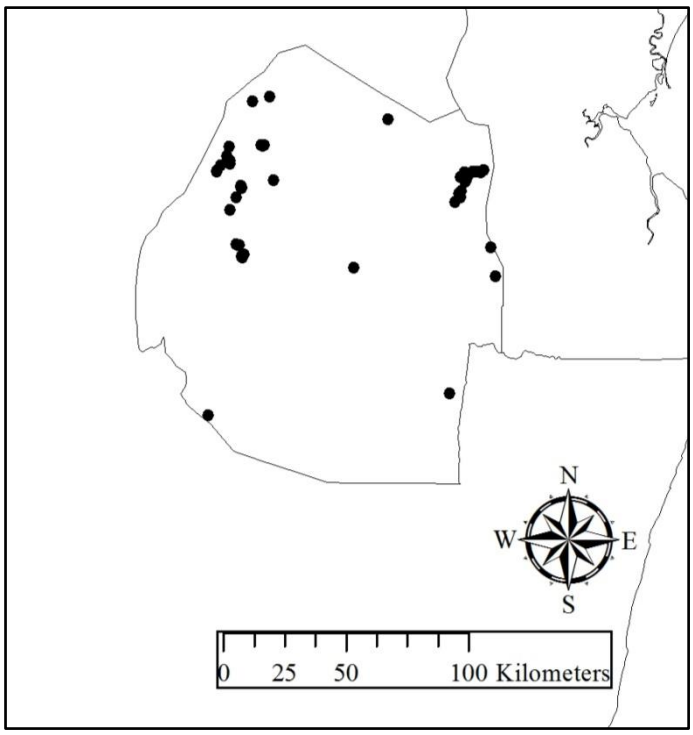
South Sudan: (644 326 km^2, 58 species, 167 records)



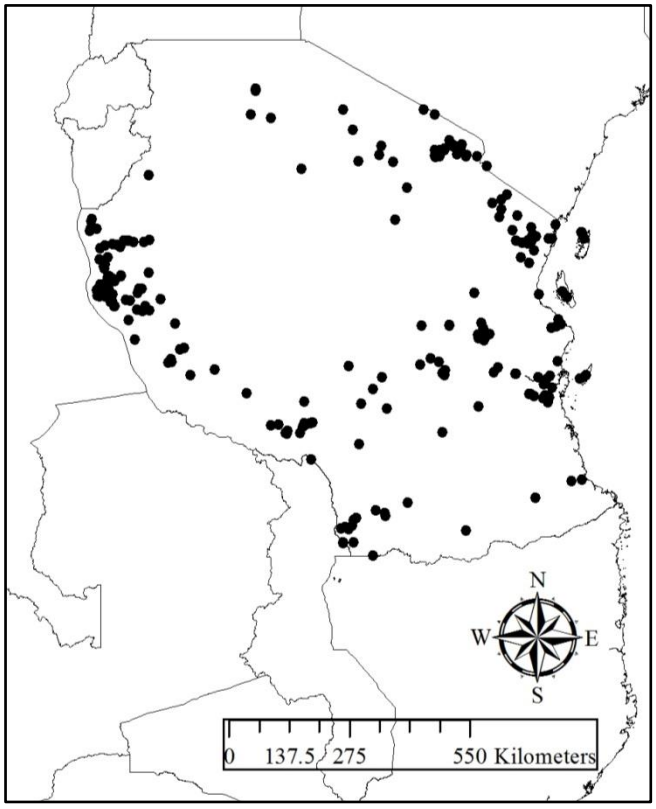
Sudan: (1 861 484 km^2, 55 species, 558 records)



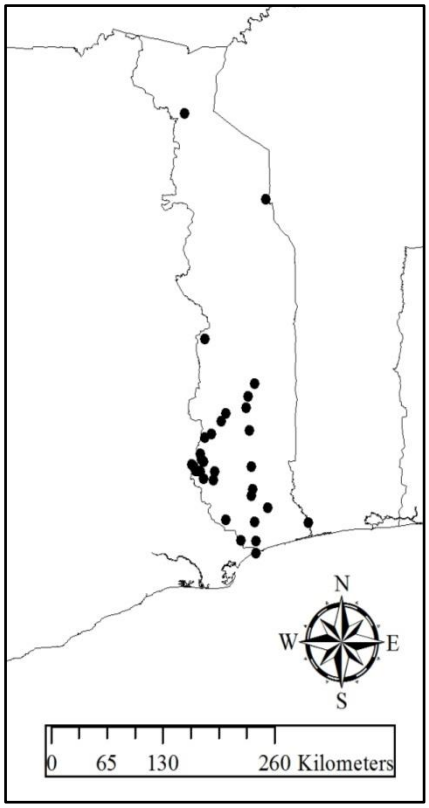
Swaziland: (17 364 km^2, 52 species, 237 records)



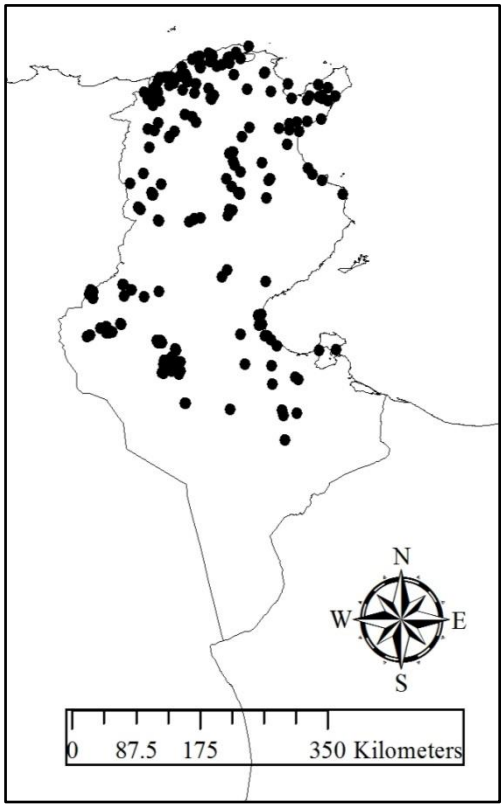
Tanzania: (945 087 km^2, 174 species, 1 948 records)



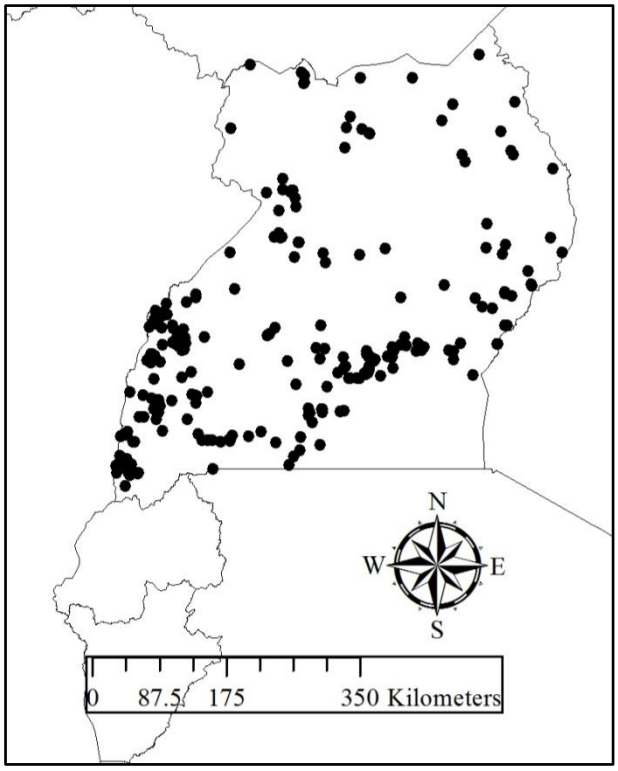
Togo: (56 785 km^2, 91 species, 477 records)



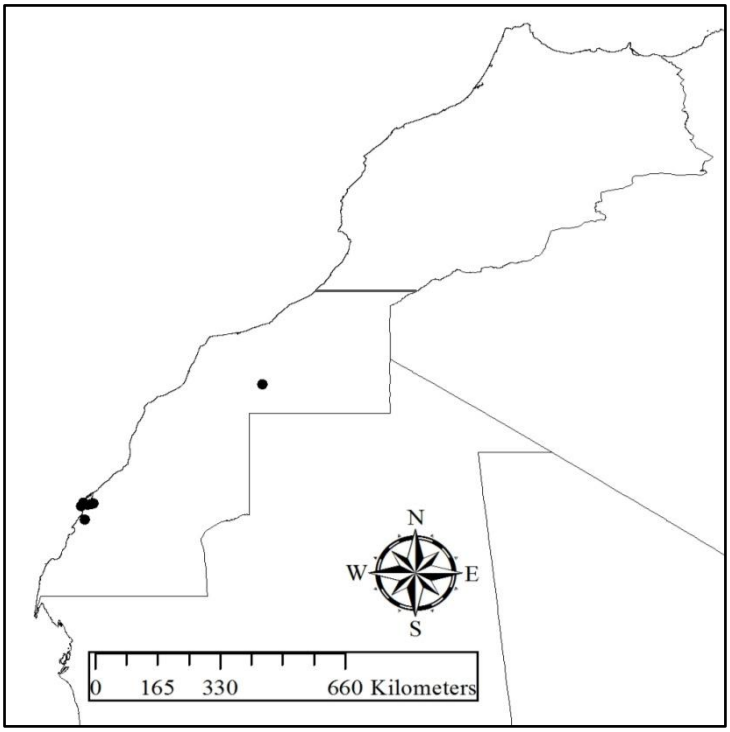
Tunisia: (163 610 km^2, 54 species, 2 444 records)



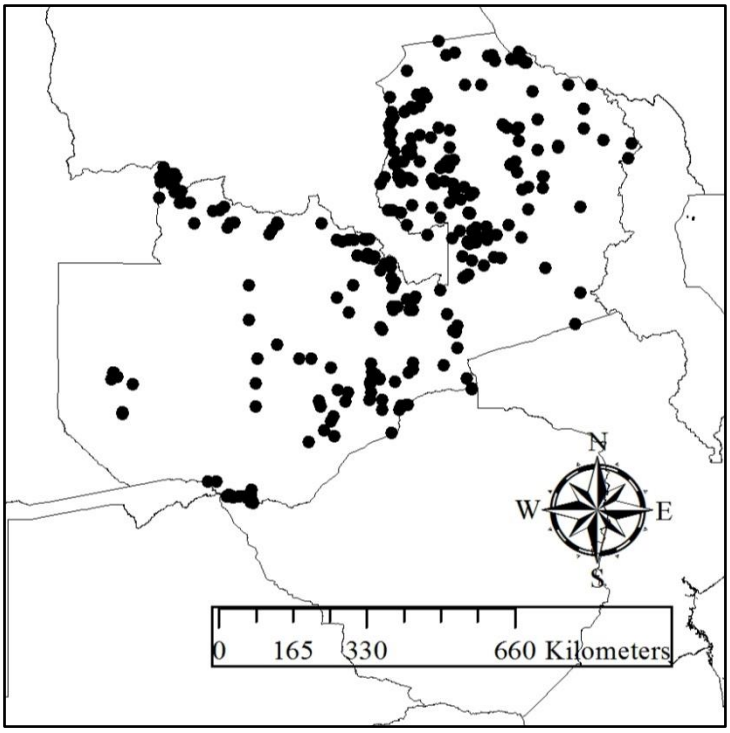
Uganda: (241 551 km^2, 213 species, 4 599 records)



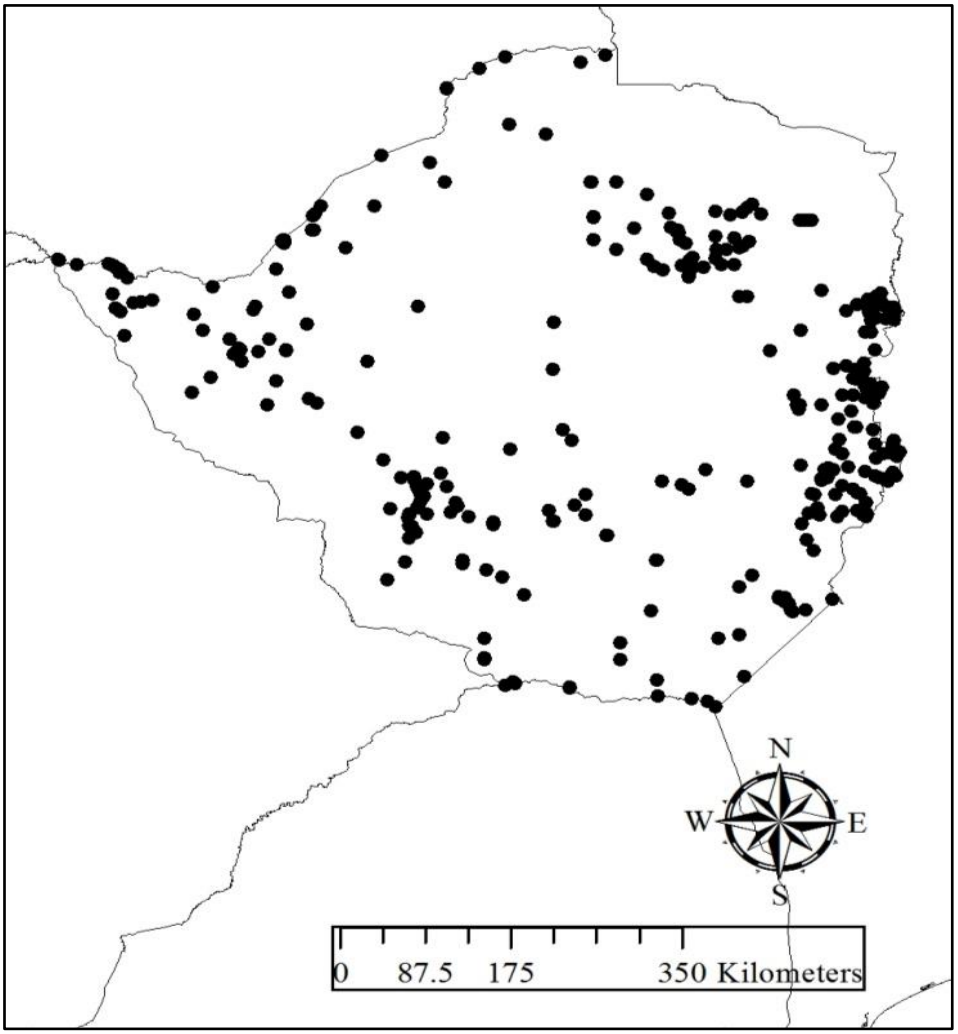
Western Sahara: (267 000 km^2, 6 species, 11 records)



Zambia: (752 618 km^2, 224 species, 5 304 records)



Zimbabwe: (390 757 km^2, 153 species, 4 182 records)



APPENDIX C3: The 48 African countries and their recorded dragonfly species.

The 48 African countries with the specific dragonfly species (Anisoptera and Zygoptera) recorded within their borders. Included, are the species global Red List (RL) threat statuses as determined by the IUCN/SSC and their respective African Dragonfly Biotic Index (ADBI) scores. The species listed within each country were determined from the distribution records listed in the Odonate Database of Africa (Kipping *et al.* 2009). The IUCN/SSC Red List abbreviations used (IUCN 2016): LC – Least Concern, NT – Near Threatened, DD – Data Deficient, VU – Vulnerable, EN – Endangered and CR – Critically Endangered. Excluded are the South Africa records as the country already has a national Dragonfly Biotic Index.

Algeria: (60 species, 1 934 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Aeshna affinis	LC	4	*Lestes numidicus*	DD	5
Aeshna cyanea	LC	3	*Lestes virens*	LC	2
Aeshna isoceles	LC	4	*Lindenia tetraphylla*	LC	5
Aeshna mixta	LC	2	*Onychogomphus costae*	NT	4
Anax ephippiger	LC	1	*Onychogomphus forcipatus*	LC	3
Anax imperator	LC	1	*Onychogomphus uncatus*	LC	3
Anax parthenope	LC	1	*Orthetrum brunneum*	LC	4
Boyeria irene	LC	3	*Orthetrum cancellatum*	LC	4
Brachythemis impartita	LC	0	*Orthetrum chrysostigma*	LC	1
Calopteryx exul	CR	7	*Orthetrum coerulescens*	LC	3
Calopteryx haemorrhoidalis	LC	3	*Orthetrum nitidinerve*	LC	4
Calopteryx virgo	LC	3	*Orthetrum ransonnetii*	LC	1
Ceriagrion tenellum	LC	4	*Orthetrum sabina*	LC	1
Chalcolestes viridis	LC	3	*Orthetrum trinacria*	LC	1
Coenagrion caerulescens	LC	4	*Pantala flavescens*	LC	1
Coenagrion mercuriale	NT	5	*Paragomphus genei*	LC	1
Coenagrion puella	LC	4	*Platycnemis subdilatata*	LC	3
Coenagrion scitulum	LC	4	*Pseudagrion hamoni*	LC	1
Cordulegaster boltonii	LC	4	*Rhyothemis semihyalina*	LC	1
Crocothemis erythraea	LC	1	*Selysiothemis nigra*	LC	2
Diplacodes lefebvrii	LC	1	*Sympecma fusca*	LC	2
Enallagma deserti	LC	4	*Sympetrum fonscolombii*	LC	0
Erythromma lindenii	LC	4	*Sympetrum meridionale*	LC	4
Erythromma viridulum	LC	4	*Sympetrum sanguineum*	LC	3
Gomphus lucasii	VU	6	*Sympetrum sinaiticum*	LC	2
Ischnura fountaineae	LC	3	*Sympetrum striolatum*	LC	3
Ischnura graellsii	LC	4	*Trithemis annulata*	LC	0
Ischnura pumilio	LC	4	*Trithemis arteriosa*	LC	0
Ischnura saharensis	LC	3	*Trithemis kirbyi*	LC	0
Lestes barbarus	LC	4	*Urothemis edwardsii*	LC	0

Angola: (195 species, 2 181 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Aciagrion africanum	LC	2	*Chlorocypha fabamacula*	LC	3
Aciagrion gracile	LC	2	*Chlorocypha victoriae*	LC	3
Aciagrion nodosum	LC	4	*Copera congolensis*	LC	4
Acisoma inflatum	LC	0	*Crenigomphus cornutus*	LC	3
Acisoma trifidum	LC	0	*Crocothemis brevistigma*	LC	4
Aethiothemis bequaerti	LC	3	*Crocothemis divisa*	LC	1
Aethiothemis ellioti	LC	3	*Crocothemis erythraea*	LC	1
Aethiothemis mediofasciata	LC	2	*Crocothemis sanguinolenta*	LC	1
Aethiothemis solitaria	LC	1	*Cyanothemis simpsoni*	LC	2
Aethriamanta rezia	LC	1	*Diastatomma selysi*	LC	4
Africallagma fractum	LC	4	*Diplacodes deminuta*	LC	3
Africallagma glaucum	LC	3	*Diplacodes lefebvrii*	LC	1
Africallagma subtile	LC	0	*Diplacodes luminans*	LC	0
Africallagma vaginale	LC	2	*Diplacodes pumila*	LC	3
Afroaeschna scotias	LC	5	*Elattoneura acuta*	LC	5
Agriocnemis angolensis	LC	4	*Elattoneura cellularis*	LC	3
Agriocnemis bumhilli	NT	5	*Elattoneura glauca*	LC	2
Agriocnemis exilis	LC	1	*Elattoneura lliba*	LC	4
Agriocnemis forcipata	LC	3	*Gomphidia quarrei*	LC	2
Agriocnemis victoria	LC	1	*Gynacantha manderica*	LC	1
Allocnemis nigripes	LC	4	*Gynacantha vesiculata*	LC	3
Allocnemis pauli	LC	4	*Hadrothemis camarensis*	LC	4
Anax congoliath	LC	3	*Hadrothemis coacta*	LC	2
Anax ephippiger	LC	1	*Heliaeschna fuliginosa*	LC	3
Anax imperator	LC	1	*Hemistigma albipunctum*	LC	0
Anax speratus	LC	2	*Ictinogomphus dundoensis*	LC	3
Anax tristis	LC	1	*Ictinogomphus ferox*	LC	1
Azuragrion nigridorsum	LC	2	*Ictinogomphus regisalberti*	LC	2
Brachythemis lacustris	LC	1	*Ischnura senegalensis*	LC	1
Brachythemis leucosticta	LC	1	*Lestes amicus*	LC	3
Ceriagrion annulatum	LC	4	*Lestes dissimulans*	LC	0
Ceriagrion corallinum	LC	0	*Lestes pallidus*	LC	1
Ceriagrion glabrum	LC	0	*Lestes pinheyi*	LC	2
Ceriagrion platystigma	LC	2	*Lestes plagiatus*	LC	2
Ceriagrion sakejii	LC	3	*Lestes tridens*	LC	0
Ceriagrion suave	LC	1	*Lestes virgatus*	LC	2
Ceriagrion varians	LC	4	*Libyogomphus tenaculatus*	LC	4
Ceriagrion whellani	LC	2	*Malgassophlebia bispina*	LC	3
Chalcostephia flavifrons	LC	1	*Micromacromia camerunica*	LC	2
Chlorocypha cancellata	LC	4	*Neodythemis afra*	LC	5
Chlorocypha crocea	LC	5	*Neodythemis klingi*	LC	2
Chlorocypha curta	LC	3	*Nesciothemis farinosa*	LC	1
Chlorocypha cyanifrons	LC	4	*Nesciothemis fitzgeraldi*	LC	3

Angola: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Neurogomphus alius	LC	3	*Phyllomacromia unifasciata*	LC	3
Notiothemis robertsi	LC	3	*Pinheyagrion angolicum*	LC	4
Notogomphus praetorius	LC	2	*Platycypha angolensis*	NT	5
Olpogastra lugubris	LC	1	*Platycypha caligata*	LC	2
Orthetrum abbotti	LC	1	*Platycypha rufitibia*	LC	3
Orthetrum austeni	LC	2	*Porpax asperipes*	LC	3
Orthetrum brachiale	LC	0	*Porpax risi*	LC	3
Orthetrum caffrum	LC	3	*Pseudagrion acaciae*	LC	2
Orthetrum chrysostigma	LC	1	*Pseudagrion angolense*	NT	4
Orthetrum guineense	LC	1	*Pseudagrion coeleste*	LC	2
Orthetrum hintzi	LC	1	*Pseudagrion coeruleipunctum*	LC	4
Orthetrum icteromelas	LC	1	*Pseudagrion deningi*	LC	4
Orthetrum julia	LC	1	*Pseudagrion estesi*	LC	3
Orthetrum machadoi	LC	1	*Pseudagrion fisheri*	LC	3
Orthetrum macrostigma	LC	4	*Pseudagrion glaucescens*	LC	1
Orthetrum microstigma	LC	0	*Pseudagrion greeni*	LC	3
Orthetrum monardi	LC	1	*Pseudagrion hamoni*	LC	1
Orthetrum robustum	LC	3	*Pseudagrion inconspicuum*	LC	3
Orthetrum saegeri	LC	2	*Pseudagrion isidromorai*	LC	2
Orthetrum stemmale	LC	1	*Pseudagrion kersteni*	LC	1
Orthetrum trinacria	LC	1	*Pseudagrion kibalense*	LC	4
Oxythemis phoenicosceles	LC	2	*Pseudagrion makabusiense*	LC	3
Palpopleura albifrons	LC	3	*Pseudagrion massaicum*	LC	3
Palpopleura deceptor	LC	0	*Pseudagrion rufostigma*	LC	3
Palpopleura jucunda	LC	0	*Pseudagrion salisburyense*	LC	2
Palpopleura lucia	LC	0	*Pseudagrion serrulatum*	LC	3
Palpopleura portia	LC	0	*Pseudagrion simonae*	LC	4
Pantala flavescens	LC	1	*Pseudagrion sjoestedti*	LC	1
Paragomphus cognatus	LC	2	*Pseudagrion sublacteum*	LC	1
Paragomphus genei	LC	1	*Rhyothemis fenestrina*	LC	1
Phaon camerunensis	LC	2	*Rhyothemis mariposa*	LC	4
Phaon iridipennis	LC	0	*Rhyothemis semihyalina*	LC	1
Phyllogomphus annulus	LC	3	*Sapho orichalcea*	LC	3
Phyllogomphus selysi	LC	2	*Sympetrum fonscolombii*	LC	0
Phyllomacromia aureozona	LC	4	*Tetrathemis fraseri*	LC	4
Phyllomacromia contumax	LC	0	*Thermochoria jeanneli*	LC	4
Phyllomacromia hervei	LC	1	*Tholymis tillarga*	LC	0
Phyllomacromia melania	LC	3	*Tramea basilaris*	LC	0
Phyllomacromia paula	LC	3	*Trithemis aconita*	LC	0
Phyllomacromia picta	LC	2	*Trithemis annulata*	LC	0

Angola: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Trithemis anomala	LC	3	*Trithemis palustris*	LC	4
Trithemis apicalis	LC	2	*Trithemis pluvialis*	LC	2
Trithemis arteriosa	LC	0	*Trithemis pruinata*	LC	1
Trithemis basitincta	LC	3	*Trithemis stictica*	LC	0
Trithemis dichroa	LC	2	*Umma electa*	LC	3
Trithemis dorsalis	LC	3	*Umma longistigma*	LC	3
Trithemis furva	LC	2	*Umma mesostigma*	LC	4
Trithemis grouti	LC	2	*Urothemis assignata*	LC	0
Trithemis imitata	LC	1	*Urothemis edwardsii*	LC	0
Trithemis integra	LC	5	*Zygonyx eusebia*	LC	2
Trithemis kirbyi	LC	0	*Zygonyx flavicosta*	LC	2
Trithemis leakeyi	LC	3	*Zygonyx natalensis*	LC	2
Trithemis monardi	LC	4	*Zygonyx regisalberti*	LC	3
Trithemis nuptialis	LC	2	*Zygonyx torridus*	LC	1

Benin: (92 species, 887 records)

Species	RL	ADBI score	Species	RL	ADBI score
Aciagrion gracile	LC	2	*Chlorocypha selysi*	LC	5
Acisoma inflatum	LC	0	*Copera sikassoensis*	LC	0
Acisoma trifidum	LC	0	*Crocothemis divisa*	LC	1
Aethriamanta rezia	LC	1	*Crocothemis erythraea*	LC	1
Africallagma subtile	LC	0	*Diplacodes lefebvrii*	LC	1
Agriocnemis exilis	LC	1	*Diplacodes luminans*	LC	0
Agriocnemis maclachlani	LC	2	*Elattoneura balli*	LC	4
Agriocnemis zerafica	LC	1	*Gomphidia gamblesi*	LC	3
Allocnemis subnodalis	LC	5	*Gynacantha cylindrata*	LC	3
Anax ephippiger	LC	1	*Gynacantha manderica*	LC	1
Anax tristis	LC	1	*Gynacantha nigeriensis*	LC	3
Brachythemis lacustris	LC	1	*Hemistigma albipunctum*	LC	0
Brachythemis leucosticta	LC	1	*Ictinogomphus ferox*	LC	1
Bradinopyga strachani	LC	0	*Ischnura senegalensis*	LC	1
Ceriagrion corallinum	LC	0	*Lestes dissimulans*	LC	0
Ceriagrion glabrum	LC	0	*Lestes ictericus*	LC	1
Ceriagrion rubellocerinum	LC	4	*Lestes ochraceus*	LC	1
Ceriagrion suave	LC	1	*Mesocnemis robusta*	LC	3
Chalcostephia flavifrons	LC	1	*Mesocnemis singularis*	LC	0
Chlorocypha curta	LC	3	*Neodythemis klingi*	LC	2
Chlorocypha pyriformosa	LC	2	*Nesciothemis pujoli*	LC	3
Chlorocypha rubida	LC	4	*Olpogastra lugubris*	LC	1

Benin: (*continued*)

Species	RL	ADBI score	Species	RL	ADBI score
Orthetrum abbotti	LC	1	*Pseudagrion kersteni*	LC	1
Orthetrum africanum	LC	2	*Pseudagrion melanicterum*	LC	0
Orthetrum angustiventre	LC	2	*Pseudagrion nubicum*	LC	0
Orthetrum austeni	LC	2	*Pseudagrion sjoestedti*	LC	1
Orthetrum brachiale	LC	0	*Pseudagrion sublacteum*	LC	1
Orthetrum chrysostigma	LC	1	*Rhyothemis fenestrina*	LC	1
Orthetrum guineense	LC	1	*Rhyothemis notata*	LC	2
Orthetrum hintzi	LC	1	*Tetrathemis camerunensis*	LC	0
Orthetrum julia	LC	1	*Thermochoria equivocata*	LC	4
Orthetrum monardi	LC	1	*Tholymis tillarga*	LC	0
Orthetrum stemmale	LC	1	*Tramea basilaris*	LC	0
Oxythemis phoenicosceles	LC	2	*Trithemis aconita*	LC	0
Palpopleura deceptor	LC	0	*Trithemis annulata*	LC	0
Palpopleura lucia	LC	0	*Trithemis arteriosa*	LC	0
Palpopleura portia	LC	0	*Trithemis dejouxi*	LC	3
Pantala flavescens	LC	1	*Trithemis dichroa*	LC	2
Paragomphus genei	LC	1	*Trithemis grouti*	LC	2
Paragomphus serrulatus	LC	2	*Trithemis imitata*	LC	1
Parazyxomma flavicans	LC	1	*Trithemis kirbyi*	LC	0
Phaon iridipennis	LC	0	*Trithetrum navasi*	LC	0
Phyllomacromia hervei	LC	1	*Urothemis assignata*	LC	0
Pseudagrion glaucescens	LC	1	*Urothemis edwardsii*	LC	0
Pseudagrion glaucum	LC	2	*Zygonyx torridus*	LC	1
Pseudagrion hamoni	LC	1	*Zyxomma atlanticum*	LC	3

Botswana: (120 species, 6 566 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Aciagrion steeleae	LC	4	*Anax ephippiger*	LC	1
Acisoma inflatum	LC	0	*Anax imperator*	LC	1
Aethiothemis solitaria	LC	1	*Anax tristis*	LC	1
Aethriamanta rezia	LC	1	*Azuragrion nigridorsum*	LC	2
Africallagma glaucum	LC	3	*Brachythemis lacustris*	LC	1
Africallagma subtile	LC	0	*Brachythemis leucosticta*	LC	1
Agriocnemis angolensis	LC	4	*Brachythemis wilsoni*	LC	2
Agriocnemis exilis	LC	1	*Bradinopyga cornuta*	LC	2
Agriocnemis gratiosa	LC	2	*Ceratogomphus pictus*	LC	3
Agriocnemis ruberrima	LC	4	*Ceriagrion corallinum*	LC	0
Agriocnemis victoria	LC	1	*Ceriagrion glabrum*	LC	0
Anax bangweuluensis	NT	5	*Ceriagrion katamborae*	LC	4

Botswana: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Ceriagrion suave	LC	1	*Palpopleura jucunda*	LC	0
Chalcostephia flavifrons	LC	1	*Palpopleura lucia*	LC	0
Crenigomphus cornutus	LC	3	*Palpopleura portia*	LC	0
Crocothemis divisa	LC	1	*Pantala flavescens*	LC	1
Crocothemis erythraea	LC	1	*Paragomphus elpidius*	LC	2
Crocothemis sanguinolenta	LC	1	*Paragomphus genei*	LC	1
Diplacodes deminuta	LC	3	*Paragomphus sabicus*	LC	2
Diplacodes lefebvrii	LC	1	*Parazyxomma flavicans*	LC	1
Diplacodes luminans	LC	0	*Phaon iridipennis*	LC	0
Elattoneura cellularis	LC	3	*Phyllogomphus selysi*	LC	2
Elattoneura glauca	LC	2	*Phyllomacromia contumax*	LC	0
Gomphidia quarrei	LC	2	*Phyllomacromia picta*	LC	2
Gynacantha villosa	LC	3	*Pinheyagrion angolicum*	LC	4
Hemistigma albipunctum	LC	0	*Platycypha caligata*	LC	2
Ictinogomphus dundoensis	LC	3	*Pseudagrion acaciae*	LC	2
Ictinogomphus ferox	LC	1	*Pseudagrion assegaii*	LC	3
Ischnura senegalensis	LC	1	*Pseudagrion coeleste*	LC	2
Lestes dissimulans	LC	0	*Pseudagrion commoniae*	LC	3
Lestes pallidus	LC	1	*Pseudagrion deningi*	LC	4
Lestes pinheyi	LC	2	*Pseudagrion fisheri*	LC	3
Lestes plagiatus	LC	2	*Pseudagrion glaucescens*	LC	1
Lestes tridens	LC	0	*Pseudagrion hageni*	LC	2
Lestes virgatus	LC	2	*Pseudagrion hamoni*	LC	1
Lestinogomphus angustus	LC	2	*Pseudagrion helenae*	LC	3
Lestinogomphus silkeae	DD	4	*Pseudagrion kersteni*	LC	1
Mesocnemis singularis	LC	0	*Pseudagrion massaicum*	LC	3
Nesciothemis farinosa	LC	1	*Pseudagrion nubicum*	LC	0
Neurogomphus cocytius	LC	3	*Pseudagrion rufostigma*	LC	3
Neurogomphus zambeziensis	LC	3	*Pseudagrion salisburyense*	LC	2
Olpogastra lugubris	LC	1	*Pseudagrion sjoestedti*	LC	1
Orthetrum abbotti	LC	1	*Pseudagrion sublacteum*	LC	1
Orthetrum brachiale	LC	0	*Pseudagrion sudanicum*	LC	2
Orthetrum chrysostigma	LC	1	*Rhyothemis fenestrina*	LC	1
Orthetrum guineense	LC	1	*Rhyothemis semihyalina*	LC	1
Orthetrum icteromelas	LC	1	*Sympetrum fonscolombii*	LC	0
Orthetrum julia	LC	1	*Tholymis tillarga*	LC	0
Orthetrum machadoi	LC	1	*Tramea basilaris*	LC	0
Orthetrum robustum	LC	3	*Tramea limbata*	LC	0
Orthetrum stemmale	LC	1	*Trithemis aconita*	LC	0
Orthetrum trinacria	LC	1	*Trithemis aequalis*	NT	4
Palpopleura deceptor	LC	0	*Trithemis annulata*	LC	0

Botswana: (*continued*)

Species	RL	ADBI score	Species	RL	ADBI score
Trithemis arteriosa	LC	0	*Trithetrum navasi*	LC	0
Trithemis donaldsoni	LC	3	*Urothemis assignata*	LC	0
Trithemis furva	LC	2	*Urothemis edwardsii*	LC	0
Trithemis hecate	LC	1	*Zosteraeschna minuscula*	LC	4
Trithemis kirbyi	LC	0	*Zygonoides fuelleborni*	LC	2
Trithemis monardi	LC	4	*Zygonyx natalensis*	LC	2
Trithemis palustris	LC	4	*Zygonyx torridus*	LC	1

Burkina Faso: (59 species, 269 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Acisoma inflatum	LC	0	*Orthetrum julia*	LC	1
Aethriamanta rezia	LC	1	*Orthetrum monardi*	LC	1
Agriocnemis exilis	LC	1	*Orthetrum stemmale*	LC	1
Agriocnemis maclachlani	LC	2	*Orthetrum trinacria*	LC	1
Agriocnemis zerafica	LC	1	*Palpopleura deceptor*	LC	0
Brachythemis impartita	LC	0	*Palpopleura lucia*	LC	0
Brachythemis lacustris	LC	1	*Palpopleura portia*	LC	0
Brachythemis leucosticta	LC	1	*Pantala flavescens*	LC	1
Brachythemis wilsoni	LC	2	*Paragomphus genei*	LC	1
Bradinopyga strachani	LC	0	*Phaon iridipennis*	LC	0
Ceriagrion glabrum	LC	0	*Pseudagrion glaucescens*	LC	1
Ceriagrion suave	LC	1	*Pseudagrion hamoni*	LC	1
Chalcostephia flavifrons	LC	1	*Pseudagrion kersteni*	LC	1
Chlorocypha curta	LC	3	*Pseudagrion melanicterum*	LC	0
Crocothemis divisa	LC	1	*Pseudagrion nubicum*	LC	0
Crocothemis erythraea	LC	1	*Pseudagrion sjoestedti*	LC	1
Crocothemis sanguinolenta	LC	1	*Pseudagrion torridum*	LC	1
Diplacodes lefebvrii	LC	1	*Tholymis tillarga*	LC	0
Elattoneura glauca	LC	2	*Tramea basilaris*	LC	0
Elattoneura nigra	LC	1	*Trithemis aconita*	LC	0
Hemistigma albipunctum	LC	0	*Trithemis annulata*	LC	0
Ictinogomphus ferox	LC	1	*Trithemis arteriosa*	LC	0
Ischnura senegalensis	LC	1	*Trithemis grouti*	LC	2
Nesciothemis pujoli	LC	3	*Trithemis imitata*	LC	1
Orthetrum abbotti	LC	1	*Trithemis kalula*	LC	2
Orthetrum angustiventre	LC	2	*Trithemis kirbyi*	LC	0
Orthetrum brachiale	LC	0	*Urothemis assignata*	LC	0
Orthetrum chrysostigma	LC	1	*Urothemis edwardsii*	LC	0
Orthetrum guineense	LC	1	*Zygonyx torridus*	LC	1
Orthetrum icteromelas	LC	1			

Burundi: (11 species, 13 records)

Species	RL	ADBI scores
Anax tristis	LC	1
Atoconeura eudoxia	LC	4
Brachythemis leucosticta	LC	1
Crenigomphus hartmanni	LC	2
Orthetrum camerunense	LC	3
Palpopleura portia	LC	0
Pseudagrion hageni	LC	2
Pseudagrion spernatum	LC	2
Stenocypha tenuis	LC	4
Trithemis dorsalis	LC	3
Trithemis stictica	LC	0

Cameroon: (213 species, 3 341 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Aciagrion africanum	LC	2	*Azuragrion buchholzi*	LC	3
Acisoma inflatum	LC	0	*Azuragrion vansomereni*	LC	0
Acisoma trifidum	LC	0	*Brachythemis impartita*	LC	0
Aethiothemis incongruens	LC	5	*Brachythemis lacustris*	LC	1
Aethriamanta rezia	LC	1	*Bradinopyga strachani*	LC	0
Africallagma subtile	LC	0	*Ceriagrion annulatum*	LC	4
Africallagma vaginale	LC	2	*Ceriagrion corallinum*	LC	0
Africocypha centripunctata	VU	7	*Ceriagrion glabrum*	LC	0
Africocypha lacuselephantum	LC	3	*Ceriagrion rubellocerinum*	LC	4
Afroaeschna scotias	LC	5	*Ceriagrion suave*	LC	1
Agriocnemis exilis	LC	1	*Ceriagrion tricrenaticeps*	LC	2
Agriocnemis forcipata	LC	3	*Ceriagrion whellani*	LC	2
Agriocnemis maclachlani	LC	2	*Chalcostephia flavifrons*	LC	1
Agriocnemis victoria	LC	1	*Chlorocypha cancellata*	LC	4
Agriocnemis zerafica	LC	1	*Chlorocypha curta*	LC	3
Allocnemis contraria	LC	4	*Chlorocypha cyanifrons*	LC	4
Allocnemis cyanura	LC	5	*Chlorocypha glauca*	LC	4
Allocnemis flavipennis	LC	4	*Chlorocypha neptunus*	DD	5
Allocnemis nigripes	LC	4	*Chlorocypha rubida*	LC	4
Allocnemis subnodalis	LC	5	*Chlorocypha selysi*	LC	5
Anax chloromelas	LC	2	*Chlorocypha victoriae*	LC	3
Anax congoliath	LC	3	*Copera rufipes*	LC	4
Anax ephippiger	LC	1	*Crenigomphus renei*	LC	0
Anax imperator	LC	1	*Crocothemis divisa*	LC	1
Anax tristis	LC	1	*Crocothemis erythraea*	LC	1
Atoconeura luxata	LC	3	*Crocothemis sanguinolenta*	LC	1

Cameroon: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Cyanothemis simpsoni	LC	2	*Neodythemis preussi*	LC	3
Diastatomma bicolor	LC	4	*Neodythemis takamandensis*	LC	4
Diastatomma tricolor	LC	4	*Nesciothemis pujoli*	LC	3
Diplacodes lefebvrii	LC	1	*Neurogomphus alius*	LC	3
Diplacodes luminans	LC	0	*Neurogomphus fuscifrons*	LC	3
Elattoneura acuta	LC	5	*Neurolestes nigeriensis*	CR	9
Elattoneura balli	LC	4	*Neurolestes trinervis*	LC	5
Elattoneura josemorai	LC	4	*Notiothemis robertsi*	LC	3
Elattoneura lindleyi	LC	3	*Notogomphus maryae*	DD	6
Elattoneura mayombensis	LC	4	*Notogomphus moorei*	LC	3
Elattoneura nigra	LC	1	*Notogomphus spinosus*	LC	5
Elattoneura pruinosa	LC	5	*Nubiolestes diotima*	LC	4
Elattoneura vittata	LC	4	*Olpogastra lugubris*	LC	1
Gomphidia gamblesi	LC	3	*Orthetrum abbotti*	LC	1
Gynacantha africana	LC	3	*Orthetrum africanum*	LC	2
Gynacantha bullata	LC	3	*Orthetrum austeni*	LC	2
Gynacantha cylindrata	LC	3	*Orthetrum brachiale*	LC	0
Gynacantha nigeriensis	LC	3	*Orthetrum caffrum*	LC	3
Gynacantha sextans	LC	3	*Orthetrum camerunense*	LC	3
Hadrothemis camarensis	LC	4	*Orthetrum chrysostigma*	LC	1
Hadrothemis coacta	LC	2	*Orthetrum guineense*	LC	1
Hadrothemis defecta	LC	1	*Orthetrum hintzi*	LC	1
Hadrothemis infesta	LC	2	*Orthetrum icteromelas*	LC	1
Hadrothemis versuta	LC	3	*Orthetrum julia*	LC	1
Heliaeschna cynthiae	LC	4	*Orthetrum microstigma*	LC	0
Heliaeschna fuliginosa	LC	3	*Orthetrum monardi*	LC	1
Heliaeschna sembe	LC	3	*Orthetrum saegeri*	LC	2
Hemistigma albipunctum	LC	0	*Orthetrum stemmale*	LC	1
Ictinogomphus fraseri	LC	2	*Orthetrum trinacria*	LC	1
Idomacromia proavita	LC	4	*Oxythemis phoenicosceles*	LC	2
Ischnura senegalensis	LC	1	*Palpopleura deceptor*	LC	0
Lestes pallidus	LC	1	*Palpopleura jucunda*	LC	0
Lestes uncifer	LC	2	*Palpopleura lucia*	LC	0
Libyogomphus mamfei	DD	6	*Palpopleura portia*	LC	0
Libyogomphus tenaculatus	LC	4	*Pantala flavescens*	LC	1
Malgassophlebia bispina	LC	3	*Paragomphus abnormis*	LC	2
Malgassophlebia westfalli	LC	6	*Paragomphus genei*	LC	1
Mesocnemis singularis	LC	0	*Paragomphus nigroviridis*	LC	3
Micromacromia camerunica	LC	2	*Parazyxomma flavicans*	LC	1
Micromacromia zygoptera	LC	4	*Pentaphlebia stahli*	VU	7
Neodythemis afra	LC	5	*Phaon camerunensis*	LC	2
Neodythemis klingi	LC	2	*Phaon iridipennis*	LC	0

Cameroon: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Phyllogomphus coloratus	LC	3	*Sapho puella*	EN	9
Phyllogomphus selysi	LC	2	*Stenocnemis pachystigma*	LC	4
Phyllomacromia bicristulata	LC	4	*Stenocypha gracilis*	LC	4
Phyllomacromia caneri	LC	5	*Tetrathemis camerunensis*	LC	0
Phyllomacromia contumax	LC	0	*Tetrathemis godiardi*	LC	4
Phyllomacromia funicularioides	NT	6	*Thermochoria equivocata*	LC	4
Phyllomacromia hervei	LC	1	*Tholymis tillarga*	LC	0
Phyllomacromia insignis	LC	4	*Tramea basilaris*	LC	0
Phyllomacromia lieftincki	LC	5	*Tramea limbata*	LC	0
Phyllomacromia melania	LC	3	*Trithemis aconita*	LC	0
Phyllomacromia paula	LC	3	*Trithemis aenea*	LC	1
Phyllomacromia sophia	LC	5	*Trithemis annulata*	LC	0
Platycypha lacustris	LC	3	*Trithemis arteriosa*	LC	0
Platycypha rufitibia	LC	3	*Trithemis basitincta*	LC	3
Porpax asperipes	LC	3	*Trithemis bredoi*	LC	2
Porpax bipunctus	LC	4	*Trithemis dichroa*	LC	2
Proischnura subfurcata	LC	2	*Trithemis furva*	LC	2
Pseudagrion camerunense	LC	1	*Trithemis grouti*	LC	2
Pseudagrion epiphonematicum	LC	3	*Trithemis hartwigi*	LC	3
Pseudagrion glaucescens	LC	1	*Trithemis imitata*	LC	1
Pseudagrion glaucoideum	LC	1	*Trithemis kalula*	LC	2
Pseudagrion glaucum	LC	2	*Trithemis kirbyi*	LC	0
Pseudagrion hamoni	LC	1	*Trithemis nuptialis*	LC	2
Pseudagrion hemicolon	LC	4	*Trithemis osvaldae*	LC	4
Pseudagrion isidromorai	LC	2	*Trithemis pruinata*	LC	1
Pseudagrion kersteni	LC	1	*Trithemis stictica*	LC	0
Pseudagrion kibalense	LC	4	*Trithemis tropicana*	LC	3
Pseudagrion melanicterum	LC	0	*Trithetrum navasi*	LC	0
Pseudagrion nubicum	LC	0	*Umma longistigma*	LC	3
Pseudagrion risi	LC	4	*Umma mesostigma*	LC	4
Pseudagrion serrulatum	LC	3	*Umma mesumbei*	EN	9
Pseudagrion sjoestedti	LC	1	*Umma saphirina*	LC	3
Pseudagrion sublacteum	LC	1	*Urothemis assignata*	LC	0
Rhyothemis fenestrina	LC	1	*Urothemis edwardsii*	LC	0
Rhyothemis notata	LC	2	*Zygonyx flavicosta*	LC	2
Rhyothemis semihyalina	LC	1	*Zygonyx speciosus*	LC	3
Sapho bicolor	LC	4	*Zygonyx torridus*	LC	1
Sapho gloriosa	LC	3	*Zyxomma atlanticum*	LC	3
Sapho orichalcea	LC	3			

Central African Republic: (105 species, 385 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Acisoma trifidum	LC	0	*Ictinogomphus regisalberti*	LC	2
Aethiothemis erythromelas	LC	4	*Mesocnemis singularis*	LC	0
Agriocnemis exilis	LC	1	*Micromacromia camerunica*	LC	2
Agriocnemis forcipata	LC	3	*Neodythemis afra*	LC	5
Agriocnemis victoria	LC	1	*Neodythemis klingi*	LC	2
Agriocnemis zerafica	LC	1	*Nesciothemis minor*	LC	2
Allocnemis cyanura	LC	5	*Nesciothemis pujoli*	LC	3
Allocnemis nigripes	LC	4	*Neurogomphus alius*	LC	3
Anax tristis	LC	1	*Neurogomphus martininus*	LC	3
Atoconeura luxata	LC	3	*Notogomphus moorei*	LC	3
Brachythemis leucosticta	LC	1	*Olpogastra lugubris*	LC	1
Bradinopyga strachani	LC	0	*Orthetrum austeni*	LC	2
Ceriagrion glabrum	LC	0	*Orthetrum brachiale*	LC	0
Chalcostephia flavifrons	LC	1	*Orthetrum chrysostigma*	LC	1
Chlorocypha aphrodite	LC	3	*Orthetrum guineense*	LC	1
Chlorocypha cancellata	LC	4	*Orthetrum hintzi*	LC	1
Chlorocypha curta	LC	3	*Orthetrum julia*	LC	1
Chlorocypha cyanifrons	LC	4	*Orthetrum latihami*	LC	2
Chlorocypha rubida	LC	4	*Orthetrum microstigma*	LC	0
Copera sikassoensis	LC	0	*Orthetrum monardi*	LC	1
Crocothemis erythraea	LC	1	*Orthetrum stemmale*	LC	1
Crocothemis sanguinolenta	LC	1	*Palpopleura deceptor*	LC	0
Cyanothemis simpsoni	LC	2	*Palpopleura lucia*	LC	0
Diastatomma selysi	LC	4	*Palpopleura portia*	LC	0
Elattoneura centrafricana	LC	4	*Pantala flavescens*	LC	1
Elattoneura lindleyi	LC	3	*Paragomphus genei*	LC	1
Elattoneura lliba	LC	4	*Paragomphus zambeziensis*	DD	4
Elattoneura nigra	LC	1	*Parazyxomma flavicans*	LC	1
Elattoneura vrijdaghi	LC	2	*Phaon iridipennis*	LC	0
Gynacantha africana	LC	3	*Phyllogomphus coloratus*	LC	3
Gynacantha bullata	LC	3	*Phyllomacromia contumax*	LC	0
Gynacantha sextans	LC	3	*Phyllomacromia hervei*	LC	1
Gynacantha vesiculata	LC	3	*Phyllomacromia insignis*	LC	4
Hadrothemis camarensis	LC	4	*Porpax asperipes*	LC	3
Hadrothemis coacta	LC	2	*Pseudagrion emarginatum*	LC	3
Hadrothemis defecta	LC	1	*Pseudagrion glaucescens*	LC	1
Hadrothemis infesta	LC	2	*Pseudagrion glaucoideum*	LC	1
Hadrothemis versuta	LC	3	*Pseudagrion hamoni*	LC	1
Heliaeschna fuliginosa	LC	3	*Pseudagrion kersteni*	LC	1
Hemistigma albipunctum	LC	0	*Pseudagrion melanicterum*	LC	0
Ictinogomphus ferox	LC	1	*Pseudagrion sjoestedti*	LC	1

Central African Republic: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Rhyothemis notata	LC	2	*Trithemis fumosa*	LC	2
Sapho bicolor	LC	4	*Trithemis grouti*	LC	2
Sapho gloriosa	LC	3	*Trithemis imitata*	LC	1
Stenocypha gracilis	LC	4	*Trithemis kalula*	LC	2
Tetrathemis camerunensis	LC	0	*Trithemis pruinata*	LC	1
Thermochoria equivocata	LC	4	*Umma longistigma*	LC	3
Tholymis tillarga	LC	0	*Umma mesostigma*	LC	4
Tramea basilaris	LC	0	*Zygonyx natalensis*	LC	2
Trithemis aconita	LC	0	*Zygonyx speciosus*	LC	3
Trithemis arteriosa	LC	0	*Zygonyx torridus*	LC	1
Trithemis dejouxi	LC	3	*Zyxomma atlanticum*	LC	3
Trithemis dichroa	LC	2			

Chad: (45 species, 251 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Agriocnemis exilis	LC	1	*Orthetrum sabina*	LC	1
Anax ephippiger	LC	1	*Palpopleura deceptor*	LC	0
Anax parthenope	LC	1	*Palpopleura lucia*	LC	0
Anax tristis	LC	1	*Palpopleura portia*	LC	0
Brachythemis impartita	LC	0	*Pantala flavescens*	LC	1
Brachythemis lacustris	LC	1	*Paragomphus genei*	LC	1
Brachythemis leucosticta	LC	1	*Pseudagrion coeleste*	LC	2
Ceriagrion glabrum	LC	0	*Pseudagrion glaucescens*	LC	1
Crocothemis erythraea	LC	1	*Pseudagrion hamoni*	LC	1
Crocothemis sanguinolenta	LC	1	*Pseudagrion kersteni*	LC	1
Diplacodes lefebvrii	LC	1	*Pseudagrion nubicum*	LC	0
Diplacodes luminans	LC	0	*Pseudagrion torridum*	LC	1
Hemistigma albipunctum	LC	0	*Rhyothemis semihyalina*	LC	1
Ischnura senegalensis	LC	1	*Sympetrum fonscolombii*	LC	0
Lestes dissimulans	LC	0	*Tholymis tillarga*	LC	0
Lestes pallidus	LC	1	*Tramea basilaris*	LC	0
Neurogomphus featheri	LC	3	*Trithemis annulata*	LC	0
Olpogastra lugubris	LC	1	*Trithemis arteriosa*	LC	0
Orthetrum brachiale	LC	0	*Trithemis furva*	LC	2
Orthetrum caffrum	LC	3	*Trithemis hecate*	LC	1
Orthetrum chrysostigma	LC	1	*Trithemis kirbyi*	LC	0
Orthetrum icteromelas	LC	1	*Urothemis edwardsii*	LC	0
Orthetrum ransonnetii	LC	1			

Congo, Republic of: (156 species, 1 432 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Aciagrion africanum	LC	2	*Elattoneura tsiamae*	LC	3
Acisoma inflatum	LC	0	*Elattoneura vittata*	LC	4
Acisoma trifidum	LC	0	*Elattoneura vrijdaghi*	LC	2
Aethiothemis basilewskyi	LC	4	*Gomphidia quarrei*	LC	2
Aethiothemis mediofasciata	LC	2	*Gynacantha africana*	LC	3
Aethiothemis solitaria	LC	1	*Gynacantha bullata*	LC	3
Aethriamanta rezia	LC	1	*Gynacantha cylindrata*	LC	3
Agriocnemis exilis	LC	1	*Gynacantha nigeriensis*	LC	3
Agriocnemis forcipata	LC	3	*Gynacantha sextans*	LC	3
Agriocnemis maclachlani	LC	2	*Hadrothemis camarensis*	LC	4
Agriocnemis victoria	LC	1	*Hadrothemis coacta*	LC	2
Allocnemis cyanura	LC	5	*Hadrothemis defecta*	LC	1
Allocnemis nigripes	LC	4	*Hadrothemis infesta*	LC	2
Anax imperator	LC	1	*Hadrothemis versuta*	LC	3
Anax tristis	LC	1	*Heliaeschna cynthiae*	LC	4
Atoconeura luxata	LC	3	*Heliaeschna fuliginosa*	LC	3
Brachythemis lacustris	LC	1	*Heliaeschna sembe*	LC	3
Brachythemis leucosticta	LC	1	*Heliaeschna ugandica*	LC	4
Ceriagrion annulatum	LC	4	*Hemistigma albipunctum*	LC	0
Ceriagrion corallinum	LC	0	*Ictinogomphus fraseri*	LC	2
Ceriagrion glabrum	LC	0	*Ictinogomphus regisalberti*	LC	2
Ceriagrion platystigma	LC	2	*Ischnura senegalensis*	LC	1
Ceriagrion varians	LC	4	*Lestes dissimulans*	LC	0
Ceriagrion whellani	LC	2	*Lestes tridens*	LC	0
Chalcostephia flavifrons	LC	1	*Libyogomphus tenaculatus*	LC	4
Chlorocypha aphrodite	LC	3	*Mesocnemis singularis*	LC	0
Chlorocypha cancellata	LC	4	*Micromacromia camerunica*	LC	2
Chlorocypha curta	LC	3	*Neodythemis afra*	LC	5
Chlorocypha cyanifrons	LC	4	*Neodythemis klingi*	LC	2
Copera congolensis	LC	4	*Neodythemis preussi*	LC	3
Copera rufipes	LC	4	*Neophya rutherfordi*	LC	3
Crocothemis erythraea	LC	1	*Neurogomphus alius*	LC	3
Crocothemis sanguinolenta	LC	1	*Neurogomphus uelensis*	LC	3
Diastatomma selysi	LC	4	*Neurolestes trinervis*	LC	5
Diastatomma tricolor	LC	4	*Notiothemis robertsi*	LC	3
Diplacodes lefebvrii	LC	1	*Notogomphus spinosus*	LC	5
Diplacodes luminans	LC	0	*Olpogastra lugubris*	LC	1
Elattoneura glauca	LC	2	*Orthetrum abbotti*	LC	1
Elattoneura incerta	LC	3	*Orthetrum africanum*	LC	2
Elattoneura josemorai	LC	4	*Orthetrum austeni*	LC	2
Elattoneura lliba	LC	4	*Orthetrum brachiale*	LC	0
Elattoneura mayombensis	LC	4	*Orthetrum chrysostigma*	LC	1
Elattoneura morini	LC	5	*Orthetrum guineense*	LC	1

Congo, Republic of: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Orthetrum hintzi	LC	1	*Pseudagrion simonae*	LC	4
Orthetrum icteromelas	LC	1	*Pseudagrion simplicilaminatum*	LC	2
Orthetrum julia	LC	1	*Pseudagrion sjoestedti*	LC	1
Orthetrum microstigma	LC	0	*Pseudagrion sublacteum*	LC	1
Orthetrum saegeri	LC	2	*Rhyothemis fenestrina*	LC	1
Orthetrum stemmale	LC	1	*Rhyothemis notata*	LC	2
Oxythemis phoenicosceles	LC	2	*Sapho bicolor*	LC	4
Palpopleura albifrons	LC	3	*Sapho gloriosa*	LC	3
Palpopleura lucia	LC	0	*Sapho orichalcea*	LC	3
Palpopleura portia	LC	0	*Stenocnemis pachystigma*	LC	4
Pantala flavescens	LC	1	*Stenocypha gracilis*	LC	4
Paragomphus acuminatus	LC	2	*Tetrathemis camerunensis*	LC	0
Parazyxomma flavicans	LC	1	*Thermochoria equivocata*	LC	4
Phaon camerunensis	LC	2	*Tholymis tillarga*	LC	0
Phaon iridipennis	LC	0	*Tramea basilaris*	LC	0
Phyllogomphus coloratus	LC	3	*Trithemis aenea*	LC	1
Phyllomacromia aureozona	LC	4	*Trithemis arteriosa*	LC	0
Phyllomacromia funicularioides	NT	6	*Trithemis dichroa*	LC	2
Phyllomacromia insignis	LC	4	*Trithemis fumosa*	LC	2
Phyllomacromia melania	LC	3	*Trithemis grouti*	LC	2
Phyllomacromia paula	LC	3	*Trithemis imitata*	LC	1
Platycypha picta	LC	3	*Trithemis kirbyi*	LC	0
Porpax asperipes	LC	3	*Trithemis nuptialis*	LC	2
Porpax bipunctus	LC	4	*Trithemis palustris*	LC	4
Pseudagrion bernardi	LC	3	*Trithemis pruinata*	LC	1
Pseudagrion camerunense	LC	1	*Trithemis stictica*	LC	0
Pseudagrion glaucescens	LC	1	*Trithemis tropicana*	LC	3
Pseudagrion glaucoideum	LC	1	*Trithetrum congoense*	LC	3
Pseudagrion glaucum	LC	2	*Umma longistigma*	LC	3
Pseudagrion grilloti	LC	6	*Umma mesostigma*	LC	4
Pseudagrion hamoni	LC	1	*Urothemis assignata*	LC	0
Pseudagrion hemicolon	LC	4	*Urothemis edwardsii*	LC	0
Pseudagrion kibalense	LC	4	*Zygonyx regisalberti*	LC	3
Pseudagrion melanicterum	LC	0	*Zygonyx torridus*	LC	1
Pseudagrion serrulatum	LC	3	*Zyxomma atlanticum*	LC	3

Cote d'Ivoire: (152 species, 785 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Aciagrion africanum	LC	2	*Acisoma inflatum*	LC	0
Aciagrion gracile	LC	2	*Acisoma trifidum*	LC	0

Cote d'Ivoire: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Aethriamanta rezia	LC	1	*Gynacantha bullata*	LC	3
Agriocnemis exilis	LC	1	*Gynacantha cylindrata*	LC	3
Agriocnemis maclachlani	LC	2	*Gynacantha manderica*	LC	1
Agriocnemis victoria	LC	1	*Gynacantha sextans*	LC	3
Agriocnemis zerafica	LC	1	*Hadrothemis camarensis*	LC	4
Allocnemis elongata	LC	4	*Hadrothemis coacta*	LC	2
Allocnemis flavipennis	LC	4	*Hadrothemis defecta*	LC	1
Allocnemis subnodalis	LC	5	*Hadrothemis infesta*	LC	2
Anax ephippiger	LC	1	*Hadrothemis versuta*	LC	3
Anax tristis	LC	1	*Heliaeschna fuliginosa*	LC	3
Azuragrion vansomereni	LC	0	*Hemistigma albipunctum*	LC	0
Brachythemis lacustris	LC	1	*Ictinogomphus ferox*	LC	1
Brachythemis leucosticta	LC	1	*Ictinogomphus fraseri*	LC	2
Brachythemis wilsoni	LC	2	*Idomacromia proavita*	LC	4
Bradinopyga strachani	LC	0	*Lestes dissimulans*	LC	0
Ceriagrion bakeri	LC	2	*Lestes ictericus*	LC	1
Ceriagrion corallinum	LC	0	*Lestes ochraceus*	LC	1
Ceriagrion glabrum	LC	0	*Lestes pallidus*	LC	1
Ceriagrion rubellocerinum	LC	4	*Lestes tridens*	LC	0
Ceriagrion suave	LC	1	*Lestinogomphus matilei*	LC	5
Ceriagrion whellani	LC	2	*Mesocnemis singularis*	LC	0
Chalcostephia flavifrons	LC	1	*Micromacromia zygoptera*	LC	4
Chlorocypha curta	LC	3	*Neodythemis klingi*	LC	2
Chlorocypha dispar	LC	5	*Neophya rutherfordi*	LC	3
Chlorocypha pyriformosa	LC	2	*Nesciothemis minor*	LC	2
Chlorocypha radix	LC	4	*Nesciothemis pujoli*	LC	3
Chlorocypha rubida	LC	4	*Olpogastra lugubris*	LC	1
Copera guttifera	LC	4	*Orthetrum abbotti*	LC	1
Copera sikassoensis	LC	0	*Orthetrum africanum*	LC	2
Crenigomphus renei	LC	0	*Orthetrum angustiventre*	LC	2
Crocothemis divisa	LC	1	*Orthetrum austeni*	LC	2
Crocothemis erythraea	LC	1	*Orthetrum brachiale*	LC	0
Crocothemis sanguinolenta	LC	1	*Orthetrum chrysostigma*	LC	1
Cyanothemis simpsoni	LC	2	*Orthetrum guineense*	LC	1
Diplacodes lefebvrii	LC	1	*Orthetrum hintzi*	LC	1
Diplacodes luminans	LC	0	*Orthetrum icteromelas*	LC	1
Elattoneura balli	LC	4	*Orthetrum julia*	LC	1
Elattoneura girardi	LC	3	*Orthetrum latihami*	LC	2
Elattoneura glauca	LC	2	*Orthetrum microstigma*	LC	0
Elattoneura nigra	LC	1	*Orthetrum monardi*	LC	1
Elattoneura villiersi	LC	4	*Orthetrum stemmale*	LC	1
Gomphidia bredoi	LC	2	*Orthetrum trinacria*	LC	1
Gynacantha africana	LC	3	*Oxythemis phoenicosceles*	LC	2

Cote d'Ivoire: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Palpopleura deceptor	LC	0	*Rhyothemis semihyalina*	LC	1
Palpopleura jucunda	LC	0	*Sapho bicolor*	LC	4
Palpopleura lucia	LC	0	*Sapho ciliata*	LC	3
Palpopleura portia	LC	0	*Sapho fumosa*	LC	4
Pantala flavescens	LC	1	*Tetrathemis camerunensis*	LC	0
Paragomphus genei	LC	1	*Tetrathemis polleni*	LC	1
Paragomphus nigroviridis	LC	3	*Thermochoria equivocata*	LC	4
Paragomphus serrulatus	LC	2	*Tholymis tillarga*	LC	0
Parazyxomma flavicans	LC	1	*Tramea basilaris*	LC	0
Phaon camerunensis	LC	2	*Tramea limbata*	LC	0
Phaon iridipennis	LC	0	*Trithemis aconita*	LC	0
Phyllogomphus aethiops	LC	2	*Trithemis aenea*	LC	1
Phyllomacromia contumax	LC	0	*Trithemis africana*	LC	4
Phyllomacromia hervei	LC	1	*Trithemis annulata*	LC	0
Phyllomacromia melania	LC	3	*Trithemis arteriosa*	LC	0
Phyllomacromia sophia	LC	5	*Trithemis bredoi*	LC	2
Porpax bipunctus	LC	4	*Trithemis dejouxi*	LC	3
Pseudagrion camerunense	LC	1	*Trithemis dichroa*	LC	2
Pseudagrion gigas	LC	3	*Trithemis grouti*	LC	2
Pseudagrion glaucescens	LC	1	*Trithemis imitata*	LC	1
Pseudagrion glaucum	LC	2	*Trithemis kalula*	LC	2
Pseudagrion hamoni	LC	1	*Trithemis kirbyi*	LC	0
Pseudagrion hemicolon	LC	4	*Trithetrum navasi*	LC	0
Pseudagrion kersteni	LC	1	*Umma cincta*	LC	2
Pseudagrion malagasoides	LC	3	*Urothemis assignata*	LC	0
Pseudagrion melanicterum	LC	0	*Urothemis edwardsii*	LC	0
Pseudagrion nubicum	LC	0	*Zygonoides fraseri*	LC	2
Pseudagrion sjoestedti	LC	1	*Zygonyx flavicosta*	LC	2
Pseudagrion sublacteum	LC	1	*Zygonyx natalensis*	LC	2
Pseudagrion torridum	LC	1	*Zygonyx torridus*	LC	1
Rhyothemis fenestrina	LC	1	*Zyxomma atlanticum*	LC	3

Democratic Republic of Congo: (332 species, 6 044 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Aciagrion africanum	LC	2	*Aethiothemis basilewskyi*	LC	4
Aciagrion brosseti	LC	3	*Aethiothemis bella*	LC	2
Aciagrion heterostictum	LC	2	*Aethiothemis bequaerti*	LC	3
Aciagrion nodosum	LC	4	*Aethiothemis ellioti*	LC	3
Aciagrion steeleae	LC	4	*Aethiothemis erythromelas*	LC	4
Acisoma trifidum	LC	0	*Aethiothemis solitaria*	LC	1

Democratic Republic of Congo: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Aethriamanta rezia	LC	1	*Ceriagrion ignitum*	LC	3
Africallagma fractum	LC	4	*Ceriagrion platystigma*	LC	2
Africallagma glaucum	LC	3	*Ceriagrion sakejii*	LC	3
Africallagma pseudelongatum	LC	3	*Ceriagrion suave*	LC	1
Africallagma sinuatum	LC	4	*Ceriagrion tricrenaticeps*	LC	2
Africallagma subtile	LC	0	*Ceriagrion varians*	LC	4
Africallagma vaginale	LC	2	*Ceriagrion whellani*	LC	2
Afroaeschna scotias	LC	5	*Chalcostephia flavifrons*	LC	1
Agriocnemis exilis	LC	1	*Chlorocypha aphrodite*	LC	3
Agriocnemis forcipata	LC	3	*Chlorocypha cancellata*	LC	4
Agriocnemis gratiosa	LC	2	*Chlorocypha consueta*	LC	2
Agriocnemis inversa	LC	4	*Chlorocypha curta*	LC	3
Agriocnemis maclachlani	LC	2	*Chlorocypha cyanifrons*	LC	4
Agriocnemis pinheyi	LC	3	*Chlorocypha fabamacula*	LC	3
Agriocnemis stygia	LC	5	*Chlorocypha frigida*	LC	6
Agriocnemis victoria	LC	1	*Chlorocypha glauca*	LC	4
Allocnemis cyanura	LC	5	*Chlorocypha pyriformosa*	LC	2
Allocnemis marshalli	LC	5	*Chlorocypha rubida*	LC	4
Allocnemis mitwabae	VU	7	*Chlorocypha trifaria*	LC	5
Allocnemis nigripes	LC	4	*Chlorocypha victoriae*	LC	3
Allocnemis pauli	LC	4	*Chlorocypha wittei*	LC	4
Allocnemis superba	LC	4	*Copera congolensis*	LC	4
Allocnemis wittei	LC	4	*Copera nyansana*	LC	4
Anaciaeschna triangulifera	LC	1	*Crenigomphus cornutus*	LC	3
Anax chloromelas	LC	2	*Crenigomphus hartmanni*	LC	2
Anax congoliath	LC	3	*Crenigomphus renei*	LC	0
Anax ephippiger	LC	1	*Crocothemis brevistigma*	LC	4
Anax imperator	LC	1	*Crocothemis divisa*	LC	1
Anax speratus	LC	2	*Crocothemis erythraea*	LC	1
Anax tristis	LC	1	*Crocothemis sanguinolenta*	LC	1
Atoconeura biordinata	LC	3	*Cyanothemis simpsoni*	LC	2
Atoconeura pseudeudoxia	LC	4	*Diastatomma multilineatum*	LC	4
Azuragrion nigridorsum	LC	2	*Diastatomma selysi*	LC	4
Brachythemis lacustris	LC	1	*Diastatomma soror*	LC	3
Brachythemis leucosticta	LC	1	*Diplacodes deminuta*	LC	3
Brachythemis wilsoni	LC	2	*Diplacodes lefebvrii*	LC	1
Bradinopyga cornuta	LC	2	*Diplacodes luminans*	LC	0
Bradinopyga strachani	LC	0	*Diplacodes pumila*	LC	3
Ceriagrion annulatum	LC	4	*Elattoneura acuta*	LC	5
Ceriagrion bakeri	LC	2	*Elattoneura cellularis*	LC	3
Ceriagrion corallinum	LC	0	*Elattoneura centrafricana*	LC	4
Ceriagrion glabrum	LC	0	*Elattoneura glauca*	LC	2

Democratic Republic of Congo: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Elattoneura incerta	LC	3	*Lestes plagiatus*	LC	2
Elattoneura lliba	LC	4	*Lestes tridens*	LC	0
Elattoneura morini	LC	5	*Lestes uncifer*	LC	2
Elattoneura nigra	LC	1	*Lestes virgatus*	LC	2
Elattoneura vittata	LC	4	*Lestinogomphus angustus*	LC	2
Elattoneura vrijdaghi	LC	2	*Lestinogomphus congoensis*	LC	3
Eleuthemis quadrigutta	LC	4	*Libyogomphus tenaculatus*	LC	4
Gomphidia bredoi	LC	2	*Malgassophlebia bispina*	LC	3
Gomphidia quarrei	LC	2	*Mesocnemis saralisa*	LC	3
Gynacantha africana	LC	3	*Mesocnemis singularis*	LC	0
Gynacantha bullata	LC	3	*Microgomphus nyassicus*	LC	5
Gynacantha cylindrata	LC	3	*Micromacromia camerunica*	LC	2
Gynacantha immaculifrons	LC	4	*Neodythemis afra*	LC	5
Gynacantha manderica	LC	1	*Neodythemis fitzgeraldi*	LC	3
Gynacantha nigeriensis	LC	3	*Neodythemis klingi*	LC	2
Gynacantha sextans	LC	3	*Neodythemis preussi*	LC	3
Gynacantha vesiculata	LC	3	*Neophya rutherfordi*	LC	3
Gynacantha villosa	LC	3	*Nesciothemis farinosa*	LC	1
Hadrothemis camarensis	LC	4	*Nesciothemis fitzgeraldi*	LC	3
Hadrothemis coacta	LC	2	*Nesciothemis nigeriensis*	LC	2
Hadrothemis defecta	LC	1	*Neurogomphus alius*	LC	3
Hadrothemis infesta	LC	2	*Neurogomphus cocytius*	LC	3
Hadrothemis scabrifrons	LC	4	*Neurogomphus martininus*	LC	3
Hadrothemis versuta	LC	3	*Neurogomphus uelensis*	LC	3
Hadrothemis vrijdaghi	LC	5	*Notiothemis robertsi*	LC	3
Heliaeschna cynthiae	LC	4	*Notogomphus dorsalis*	LC	2
Heliaeschna fuliginosa	LC	3	*Notogomphus leroyi*	LC	4
Heliaeschna sembe	LC	3	*Notogomphus lujai*	LC	4
Heliaeschna ugandica	LC	4	*Notogomphus praetorius*	LC	2
Hemistigma albipunctum	LC	0	*Notogomphus spinosus*	LC	5
Ictinogomphus dundoensis	LC	3	*Olpogastra lugubris*	LC	1
Ictinogomphus ferox	LC	1	*Onychogomphus seydeli*	LC	3
Ictinogomphus regisalberti	LC	2	*Orthetrum abbotti*	LC	1
Idomacromia proavita	LC	4	*Orthetrum africanum*	LC	2
Ischnura senegalensis	LC	1	*Orthetrum angustiventre*	LC	2
Lestes amicus	LC	3	*Orthetrum austeni*	LC	2
Lestes dissimulans	LC	0	*Orthetrum brachiale*	LC	0
Lestes ictericus	LC	1	*Orthetrum caffrum*	LC	3
Lestes ochraceus	LC	1	*Orthetrum camerunense*	LC	3
Lestes pallidus	LC	1	*Orthetrum chrysostigma*	LC	1
Lestes pinheyi	LC	2	*Orthetrum guineense*	LC	1

Democratic Republic of Congo: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Orthetrum hintzi	LC	1	*Pinheyschna rileyi*	LC	3
Orthetrum icteromelas	LC	1	*Platycypha caligata*	LC	2
Orthetrum julia	LC	1	*Platycypha eliseva*	LC	4
Orthetrum latihami	LC	2	*Platycypha lacustris*	LC	3
Orthetrum machadoi	LC	1	*Platycypha picta*	LC	3
Orthetrum macrostigma	LC	4	*Platycypha pinheyi*	NT	6
Orthetrum microstigma	LC	0	*Platycypha rufitibia*	LC	3
Orthetrum monardi	LC	1	*Porpax asperipes*	LC	3
Orthetrum robustum	LC	3	*Porpax bipunctus*	LC	4
Orthetrum saegeri	LC	2	*Porpax garambensis*	LC	4
Orthetrum stemmale	LC	1	*Porpax risi*	LC	3
Orthetrum trinacria	LC	1	*Porpax sentipes*	LC	4
Oxythemis phoenicosceles	LC	2	*Proischnura subfurcata*	LC	2
Palpopleura albifrons	LC	3	*Pseudagrion acaciae*	LC	2
Palpopleura deceptor	LC	0	*Pseudagrion coeruleipunctum*	LC	4
Palpopleura jucunda	LC	0	*Pseudagrion deningi*	LC	4
Palpopleura lucia	LC	0	*Pseudagrion emarginatum*	LC	3
Palpopleura portia	LC	0	*Pseudagrion gamblesi*	LC	2
Pantala flavescens	LC	1	*Pseudagrion glaucescens*	LC	1
Paragomphus acuminatus	LC	2	*Pseudagrion glaucoideum*	LC	1
Paragomphus cognatus	LC	2	*Pseudagrion glaucum*	LC	2
Paragomphus elpidius	LC	2	*Pseudagrion greeni*	LC	3
Paragomphus genei	LC	1	*Pseudagrion hageni*	LC	2
Paragomphus machadoi	LC	3	*Pseudagrion hamoni*	LC	1
Paragomphus nigroviridis	LC	3	*Pseudagrion inconspicuum*	LC	3
Paragomphus serrulatus	LC	2	*Pseudagrion isidromorai*	LC	2
Paragomphus viridior	LC	3	*Pseudagrion kersteni*	LC	1
Parazyxomma flavicans	LC	1	*Pseudagrion kibalense*	LC	4
Phaon camerunensis	LC	2	*Pseudagrion makabusiense*	LC	3
Phaon iridipennis	LC	0	*Pseudagrion malagasoides*	LC	3
Phyllogomphus annulus	LC	3	*Pseudagrion massaicum*	LC	3
Phyllogomphus coloratus	LC	3	*Pseudagrion melanicterum*	LC	0
Phyllogomphus selysi	LC	2	*Pseudagrion nubicum*	LC	0
Phyllomacromia aureozona	LC	4	*Pseudagrion rufocinctum*	LC	5
Phyllomacromia contumax	LC	0	*Pseudagrion salisburyense*	LC	2
Phyllomacromia maesi	LC	3	*Pseudagrion serrulatum*	LC	3
Phyllomacromia melania	LC	3	*Pseudagrion simplicilaminatum*	LC	2
Phyllomacromia monoceros	LC	4	*Pseudagrion sjoestedti*	LC	1
Phyllomacromia paula	LC	3	*Pseudagrion spernatum*	LC	2
Phyllomacromia picta	LC	2	*Pseudagrion sublacteum*	LC	1
Phyllomacromia sylvatica	LC	5	*Pseudagrion sudanicum*	LC	2
Phyllomacromia unifasciata	LC	3	*Pseudagrion symoensii*	VU	6
Pinheyschna meruensis	LC	4	*Pseudagrion thenartum*	LC	5

Democratic Republic of Congo: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Pseudagrion torridum	LC	1	*Trithemis grouti*	LC	2
Rhyothemis fenestrina	LC	1	*Trithemis hartwigi*	LC	3
Rhyothemis mariposa	LC	4	*Trithemis hecate*	LC	1
Rhyothemis notata	LC	2	*Trithemis imitata*	LC	1
Rhyothemis semihyalina	LC	1	*Trithemis integra*	LC	5
Sapho bicolor	LC	4	*Trithemis kalula*	LC	2
Sapho gloriosa	LC	3	*Trithemis kirbyi*	LC	0
Sapho orichalcea	LC	3	*Trithemis leakeyi*	LC	3
Stenocypha gracilis	LC	4	*Trithemis longistyla*	LC	4
Stenocypha jacksoni	NT	6	*Trithemis monardi*	LC	4
Stenocypha molindica	NT	7	*Trithemis nuptialis*	LC	2
Stenocypha tenuis	LC	4	*Trithemis pluvialis*	LC	2
Tetrathemis camerunensis	LC	0	*Trithemis pruinata*	LC	1
Tetrathemis corduliformis	LC	4	*Trithemis stictica*	LC	0
Tetrathemis longfieldae	LC	4	*Trithemis tropicana*	LC	3
Tetrathemis polleni	LC	1	*Trithemis werneri*	LC	2
Thermochoria equivocata	LC	4	*Trithetrum congoense*	LC	3
Thermochoria jeanneli	LC	4	*Trithetrum navasi*	LC	0
Tholymis tillarga	LC	0	*Umma cincta*	LC	2
Tramea basilaris	LC	0	*Umma electa*	LC	3
Tramea limbata	LC	0	*Umma longistigma*	LC	3
Trithemis aconita	LC	0	*Umma saphirina*	LC	3
Trithemis aenea	LC	1	*Urothemis assignata*	LC	0
Trithemis annulata	LC	0	*Urothemis edwardsii*	LC	0
Trithemis anomala	LC	3	*Zosteraeschna ellioti*	LC	3
Trithemis apicalis	LC	2	*Zygonoides fuelleborni*	LC	2
Trithemis arteriosa	LC	0	*Zygonoides occidentis*	LC	2
Trithemis bifida	LC	0	*Zygonyx atritibiae*	LC	3
Trithemis bredoi	LC	2	*Zygonyx eusebia*	LC	2
Trithemis congolica	LC	3	*Zygonyx flavicosta*	LC	2
Trithemis dichroa	LC	2	*Zygonyx natalensis*	LC	2
Trithemis donaldsoni	LC	3	*Zygonyx regisalberti*	LC	3
Trithemis dorsalis	LC	3	*Zygonyx torridus*	LC	1
Trithemis furva	LC	2	*Zyxomma atlanticum*	LC	3

Djibouti: (8 species, 20 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Anax ephippiger	LC	1	*Ischnura senegalensis*	LC	1
Crocothemis erythraea	LC	1	*Orthetrum sabina*	LC	1
Hemistigma albipunctum	LC	0	*Pantala flavescens*	LC	1
Ischnura evansi	LC	4	*Trithemis arteriosa*	LC	0

Egypt: (32 species, 1 211 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Aeshna mixta	LC	2	*Orthetrum machadoi*	LC	1
Agriocnemis sania	LC	3	*Orthetrum ransonnetii*	LC	1
Anax ephippiger	LC	1	*Orthetrum sabina*	LC	1
Anax imperator	LC	1	*Orthetrum trinacria*	LC	1
Anax parthenope	LC	1	*Pantala flavescens*	LC	1
Brachythemis impartita	LC	0	*Paragomphus pumilio*	LC	2
Ceriagrion glabrum	LC	0	*Pseudagrion niloticum*	LC	3
Crocothemis erythraea	LC	1	*Pseudagrion nubicum*	LC	0
Diplacodes lefebvrii	LC	1	*Pseudagrion torridum*	LC	1
Ischnura evansi	LC	4	*Selysiothemis nigra*	LC	2
Ischnura fountaineae	LC	3	*Sympecma fusca*	LC	2
Ischnura senegalensis	LC	1	*Sympetrum fonscolombii*	LC	0
Mesocnemis robusta	LC	3	*Sympetrum sinaiticum*	LC	2
Nesciothemis farinosa	LC	1	*Trithemis annulata*	LC	0
Orthetrum chrysostigma	LC	1	*Trithemis arteriosa*	LC	0
Orthetrum coerulescens	LC	3	*Trithemis kirbyi*	LC	0

Equatorial-Guinea: (69 species, 108 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Acisoma trifidum	LC	0	*Gynacantha sextans*	LC	3
Anax chloromelas	LC	2	*Hadrothemis camarensis*	LC	4
Anax imperator	LC	1	*Hadrothemis coacta*	LC	2
Anax tristis	LC	1	*Hadrothemis defecta*	LC	1
Bradinopyga strachani	LC	0	*Hadrothemis infesta*	LC	2
Ceriagrion glabrum	LC	0	*Hadrothemis versuta*	LC	3
Ceriagrion whellani	LC	2	*Heliaeschna fuliginosa*	LC	3
Chlorocypha cyanifrons	LC	4	*Hemistigma albipunctum*	LC	0
Chlorocypha selysi	LC	5	*Ischnura senegalensis*	LC	1
Cornigomphus guineensis	LC	5	*Lestes dissimulans*	LC	0
Crocothemis divisa	LC	1	*Micromacromia camerunica*	LC	2
Crocothemis erythraea	LC	1	*Neodythemis preussi*	LC	3
Diastatomma bicolor	LC	4	*Neurogomphus alius*	LC	3
Diplacodes lefebvrii	LC	1	*Neurolestes trinervis*	LC	5
Diplacodes luminans	LC	0	*Olpogastra lugubris*	LC	1
Elattoneura josemorai	LC	4	*Orthetrum africanum*	LC	2
Elattoneura vittata	LC	4	*Orthetrum austeni*	LC	2
Gynacantha africana	LC	3	*Orthetrum guineense*	LC	1
Gynacantha bullata	LC	3	*Orthetrum hintzi*	LC	1
Gynacantha cylindrata	LC	3	*Orthetrum julia*	LC	1

Equatorial-Guinea: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Orthetrum microstigma	LC	0	*Pseudagrion serrulatum*	LC	3
Orthetrum stemmale	LC	1	*Pseudagrion sjoestedti*	LC	1
Palpopleura lucia	LC	0	*Stenocypha gracilis*	LC	4
Palpopleura portia	LC	0	*Tetrathemis camerunensis*	LC	0
Pantala flavescens	LC	1	*Thermochoria equivocata*	LC	4
Phaon camerunensis	LC	2	*Tholymis tillarga*	LC	0
Phaon iridipennis	LC	0	*Trithemis aconita*	LC	0
Phyllogomphus coloratus	LC	3	*Trithemis arteriosa*	LC	0
Phyllomacromia lieftincki	LC	5	*Trithemis grouti*	LC	2
Phyllomacromia melania	LC	3	*Trithemis nuptialis*	LC	2
Porpax asperipes	LC	3	*Umma longistigma*	LC	3
Pseudagrion glaucum	LC	2	*Urothemis assignata*	LC	0
Pseudagrion isidromorai	LC	2	*Zygonyx flavicosta*	LC	2
Pseudagrion kibalense	LC	4	*Zyxomma atlanticum*	LC	3
Pseudagrion melanicterum	LC	0			

Eritrea: (20 species, 35 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Africallagma elongatum	LC	3	*Paragomphus genei*	LC	1
Anax ephippiger	LC	1	*Proischnura subfurcata*	LC	2
Anax imperator	LC	1	*Pseudagrion kersteni*	LC	1
Anax speratus	LC	2	*Pseudagrion spernatum*	LC	2
Crocothemis erythraea	LC	1	*Sympetrum fonscolombii*	LC	0
Orthetrum caffrum	LC	3	*Trithemis annulata*	LC	0
Orthetrum chrysostigma	LC	1	*Trithemis arteriosa*	LC	0
Orthetrum julia	LC	1	*Trithemis ellenbeckii*	LC	4
Orthetrum sabina	LC	1	*Trithemis furva*	LC	2
Pantala flavescens	LC	1	*Trithemis kirbyi*	LC	0

Ethiopia: (99 species, 1 000 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Acisoma inflatum	LC	0	*Agriocnemis sania*	LC	3
Acisoma variegatum	LC	3	*Anaciaeschna triangulifera*	LC	1
Africallagma elongatum	LC	3	*Anax ephippiger*	LC	1
Africallagma subtile	LC	0	*Anax imperator*	LC	1
Agriocnemis exilis	LC	1	*Anax speratus*	LC	2
Agriocnemis inversa	LC	4	*Atoconeura aethiopica*	VU	6

Ethiopia: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Azuragrion vansomereni	LC	0	*Palpopleura deceptor*	LC	0
Brachythemis impartita	LC	0	*Palpopleura jucunda*	LC	0
Brachythemis lacustris	LC	1	*Palpopleura lucia*	LC	0
Brachythemis leucosticta	LC	1	*Palpopleura portia*	LC	0
Bradinopyga strachani	LC	0	*Pantala flavescens*	LC	1
Ceriagrion glabrum	LC	0	*Paragomphus alluaudi*	LC	3
Chalcostephia flavifrons	LC	1	*Paragomphus crenigomphoides*	NT	5
Crenigomphus renei	LC	0	*Paragomphus genei*	LC	1
Crocothemis erythraea	LC	1	*Phaon iridipennis*	LC	0
Crocothemis sanguinolenta	LC	1	*Phyllomacromia pallidinervis*	LC	3
Diplacodes lefebvrii	LC	1	*Phyllomacromia picta*	LC	2
Diplacodes luminans	LC	0	*Pinheyschna waterstoni*	NT	4
Elattoneura pasquinii	VU	6	*Platycypha caligata*	LC	2
Gynacantha nigeriensis	LC	3	*Proischnura subfurcata*	LC	2
Gynacantha vesiculata	LC	3	*Pseudagrion commoniae*	LC	3
Gynacantha villosa	LC	3	*Pseudagrion gamblesi*	LC	2
Hemistigma albipunctum	LC	0	*Pseudagrion guichardi*	VU	7
Ictinogomphus ferox	LC	1	*Pseudagrion hamoni*	LC	1
Ischnura abyssinica	NT	6	*Pseudagrion kaffinum*	VU	6
Ischnura senegalensis	LC	1	*Pseudagrion kersteni*	LC	1
Lestes pallidus	LC	1	*Pseudagrion massaicum*	LC	3
Lestes tridens	LC	0	*Pseudagrion niloticum*	LC	3
Lestes virgatus	LC	2	*Pseudagrion nubicum*	LC	0
Nesciothemis farinosa	LC	1	*Pseudagrion salisburyense*	LC	2
Notogomphus cottarellii	EN	8	*Pseudagrion spernatum*	LC	2
Notogomphus dorsalis	LC	2	*Pseudagrion sublacteum*	LC	1
Notogomphus lecythus	LC	2	*Pseudagrion torridum*	LC	1
Notogomphus ruppeli	EN	9	*Rhyothemis semihyalina*	LC	1
Orthetrum abbotti	LC	1	*Sympetrum fonscolombii*	LC	0
Orthetrum brachiale	LC	0	*Tholymis tillarga*	LC	0
Orthetrum caffrum	LC	3	*Tramea basilaris*	LC	0
Orthetrum chrysostigma	LC	1	*Tramea limbata*	LC	0
Orthetrum guineense	LC	1	*Trithemis aconita*	LC	0
Orthetrum hintzi	LC	1	*Trithemis annulata*	LC	0
Orthetrum julia	LC	1	*Trithemis arteriosa*	LC	0
Orthetrum kristenseni	LC	4	*Trithemis dejouxi*	LC	3
Orthetrum machadoi	LC	1	*Trithemis ellenbeckii*	LC	4
Orthetrum monardi	LC	1	*Trithemis furva*	LC	2
Orthetrum sabina	LC	1	*Trithemis imitata*	LC	1
Orthetrum stemmale	LC	1	*Trithemis kirbyi*	LC	0
Orthetrum trinacria	LC	1	*Trithemis stictica*	LC	0

Ethiopia: (*continued*)

Species	RL	ADBI scores
Urothemis assignata	LC	0
Urothemis edwardsii	LC	0
Zosteraeschna ellioti	LC	3
Zygonyx natalensis	LC	2
Zygonyx torridus	LC	1

Gabon: (223 species, 9 973 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Aciagrion africanum	LC	2	*Bradinopyga strachani*	LC	0
Aciagrion balachowskyi	LC	6	*Ceriagrion annulatum*	LC	4
Aciagrion brosseti	LC	3	*Ceriagrion bakeri*	LC	2
Aciagrion nodosum	LC	4	*Ceriagrion corallinum*	LC	0
Acisoma inflatum	LC	0	*Ceriagrion glabrum*	LC	0
Acisoma trifidum	LC	0	*Ceriagrion platystigma*	LC	2
Aethiothemis basilewskyi	LC	4	*Ceriagrion tricrenaticeps*	LC	2
Aethiothemis erythromelas	LC	4	*Ceriagrion varians*	LC	4
Aethiothemis mediofasciata	LC	2	*Ceriagrion whellani*	LC	2
Aethiothemis solitaria	LC	1	*Chalcostephia flavifrons*	LC	1
Aethriamanta rezia	LC	1	*Chlorocypha aphrodite*	LC	3
Africallagma vaginale	LC	2	*Chlorocypha cancellata*	LC	4
Africocypha lacuselephantum	LC	3	*Chlorocypha curta*	LC	3
Afroaeschna scotias	LC	5	*Chlorocypha cyanifrons*	LC	4
Agriocnemis exilis	LC	1	*Chlorocypha glauca*	LC	4
Agriocnemis forcipata	LC	3	*Chlorocypha helenae*	NT	6
Agriocnemis maclachlani	LC	2	*Chlorocypha pyriformosa*	LC	2
Agriocnemis stygia	LC	5	*Chlorocypha rubida*	LC	4
Agriocnemis victoria	LC	1	*Copera congolensis*	LC	4
Allocnemis contraria	LC	4	*Copera nyansana*	LC	4
Allocnemis cyanura	LC	5	*Copera rufipes*	LC	4
Allocnemis nigripes	LC	4	*Cornigomphus guineensis*	LC	5
Allocnemis pauli	LC	4	*Crocothemis divisa*	LC	1
Anax chloromelas	LC	2	*Crocothemis erythraea*	LC	1
Anax congoliath	LC	3	*Crocothemis sanguinolenta*	LC	1
Anax ephippiger	LC	1	*Cyanothemis simpsoni*	LC	2
Anax imperator	LC	1	*Diastatomma multilineatum*	LC	4
Anax tristis	LC	1	*Diastatomma selysi*	LC	4
Atoconeura luxata	LC	3	*Diastatomma tricolor*	LC	4
Azuragrion buchholzi	LC	3	*Diplacodes deminuta*	LC	3
Brachythemis impartita	LC	0	*Diplacodes lefebvrii*	LC	1

Gabon: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Diplacodes luminans	LC	0	*Micromacromia camerunica*	LC	2
Elattoneura acuta	LC	5	*Micromacromia zygoptera*	LC	4
Elattoneura incerta	LC	3	*Neodythemis afra*	LC	5
Elattoneura josemorai	LC	4	*Neodythemis klingi*	LC	2
Elattoneura lliba	LC	4	*Neodythemis preussi*	LC	3
Elattoneura mayombensis	LC	4	*Neodythemis takamandensis*	LC	4
Elattoneura morini	LC	5	*Neophya rutherfordi*	LC	3
Elattoneura tsiamae	LC	3	*Nesciothemis nigeriensis*	LC	2
Elattoneura vittata	LC	4	*Neurogomphus alius*	LC	3
Elattoneura vrijdaghi	LC	2	*Neurogomphus uelensis*	LC	3
Eleuthemis buettikoferi	LC	2	*Neurolestes trinervis*	LC	5
Gomphidia gamblesi	LC	3	*Notiothemis robertsi*	LC	3
Gomphidia quarrei	LC	2	*Notogomphus spinosus*	LC	5
Gynacantha africana	LC	3	*Nubiolestes diotima*	LC	4
Gynacantha bullata	LC	3	*Olpogastra lugubris*	LC	1
Gynacantha cylindrata	LC	3	*Orthetrum abbotti*	LC	1
Gynacantha sextans	LC	3	*Orthetrum africanum*	LC	2
Gynacantha vesiculata	LC	3	*Orthetrum austeni*	LC	2
Gynacantha victoriae	LC	3	*Orthetrum brachiale*	LC	0
Hadrothemis camarensis	LC	4	*Orthetrum guineense*	LC	1
Hadrothemis coacta	LC	2	*Orthetrum hintzi*	LC	1
Hadrothemis defecta	LC	1	*Orthetrum icteromelas*	LC	1
Hadrothemis infesta	LC	2	*Orthetrum julia*	LC	1
Hadrothemis versuta	LC	3	*Orthetrum microstigma*	LC	0
Heliaeschna cynthiae	LC	4	*Orthetrum saegeri*	LC	2
Heliaeschna fuliginosa	LC	3	*Orthetrum stemmale*	LC	1
Heliaeschna sembe	LC	3	*Orthetrum trinacria*	LC	1
Hemistigma albipunctum	LC	0	*Oxythemis phoenicosceles*	LC	2
Ictinogomphus fraseri	LC	2	*Palpopleura albifrons*	LC	3
Ictinogomphus regisalberti	LC	2	*Palpopleura lucia*	LC	0
Idomacromia proavita	LC	4	*Palpopleura portia*	LC	0
Ischnura senegalensis	LC	1	*Pantala flavescens*	LC	1
Lestes dissimulans	LC	0	*Paragomphus abnormis*	LC	2
Lestes ochraceus	LC	1	*Paragomphus machadoi*	LC	3
Lestes pinheyi	LC	2	*Paragomphus nigroviridis*	LC	3
Lestes tridens	LC	0	*Paragomphus serrulatus*	LC	2
Lestes uncifer	LC	2	*Parazyxomma flavicans*	LC	1
Lestinogomphus congoensis	LC	3	*Phaon camerunensis*	LC	2
Libyogomphus emiliae	LC	5	*Phaon iridipennis*	LC	0
Libyogomphus tenaculatus	LC	4	*Phyllogomphus annulus*	LC	3
Malgassophlebia bispina	LC	3	*Phyllogomphus coloratus*	LC	3
Malgassophlebia westfalli	LC	6	*Phyllogomphus selysi*	LC	2

Gabon: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Phyllomacromia bicristulata	LC	4	*Tetrathemis camerunensis*	LC	0
Phyllomacromia contumax	LC	0	*Tetrathemis fraseri*	LC	4
Phyllomacromia funicularioides	NT	6	*Tetrathemis longfieldae*	LC	4
Phyllomacromia insignis	LC	4	*Thermochoria equivocata*	LC	4
Phyllomacromia maesi	LC	3	*Tholymis tillarga*	LC	0
Phyllomacromia melania	LC	3	*Tragogomphus ellioti*	NT	6
Phyllomacromia paula	LC	3	*Tramea basilaris*	LC	0
Platycypha picta	LC	3	*Trithemis aconita*	LC	0
Platycypha rufitibia	LC	3	*Trithemis aenea*	LC	1
Porpax asperipes	LC	3	*Trithemis annulata*	LC	0
Porpax bipunctus	LC	4	*Trithemis apicalis*	LC	2
Porpax garambensis	LC	4	*Trithemis arteriosa*	LC	0
Porpax sentipes	LC	4	*Trithemis basitincta*	LC	3
Pseudagrion bernardi	LC	3	*Trithemis bifida*	LC	0
Pseudagrion camerunense	LC	1	*Trithemis congolica*	LC	3
Pseudagrion coeruleipunctum	LC	4	*Trithemis dichroa*	LC	2
Pseudagrion epiphonematicum	LC	3	*Trithemis fumosa*	LC	2
Pseudagrion glaucescens	LC	1	*Trithemis grouti*	LC	2
Pseudagrion glaucoideum	LC	1	*Trithemis hartwigi*	LC	3
Pseudagrion glaucum	LC	2	*Trithemis hecate*	LC	1
Pseudagrion grilloti	LC	6	*Trithemis imitata*	LC	1
Pseudagrion hamoni	LC	1	*Trithemis nuptialis*	LC	2
Pseudagrion helenae	LC	3	*Trithemis osvaldae*	LC	4
Pseudagrion hemicolon	LC	4	*Trithemis pruinata*	LC	1
Pseudagrion isidromorai	LC	2	*Trithemis tropicana*	LC	3
Pseudagrion kibalense	LC	4	*Trithetrum congoense*	LC	3
Pseudagrion melanicterum	LC	0	*Trithetrum navasi*	LC	0
Pseudagrion serrulatum	LC	3	*Umma cincta*	LC	2
Pseudagrion simonae	LC	4	*Umma longistigma*	LC	3
Pseudagrion simplicilaminatum	LC	2	*Umma mesostigma*	LC	4
Pseudagrion sjoestedti	LC	1	*Urothemis assignata*	LC	0
Pseudagrion torridum	LC	1	*Urothemis edwardsii*	LC	0
Rhyothemis fenestrina	LC	1	*Zygonyx flavicosta*	LC	2
Rhyothemis notata	LC	2	*Zygonyx natalensis*	LC	2
Rhyothemis semihyalina	LC	1	*Zygonyx regisalberti*	LC	3
Sapho bicolor	LC	4	*Zygonyx speciosus*	LC	3
Sapho gloriosa	LC	3	*Zygonyx torridus*	LC	1
Stenocnemis pachystigma	LC	4	*Zyxomma atlanticum*	LC	3
Stenocypha gracilis	LC	4			

Gambia: (75 species, 1 337 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Acisoma inflatum	LC	0	*Orthetrum icteromelas*	LC	1
Acisoma trifidum	LC	0	*Orthetrum julia*	LC	1
Aethriamanta rezia	LC	1	*Orthetrum monardi*	LC	1
Agriocnemis exilis	LC	1	*Orthetrum stemmale*	LC	1
Agriocnemis maclachlani	LC	2	*Orthetrum trinacria*	LC	1
Agriocnemis victoria	LC	1	*Oxythemis phoenicosceles*	LC	2
Agriocnemis zerafica	LC	1	*Palpopleura deceptor*	LC	0
Anax ephippiger	LC	1	*Palpopleura lucia*	LC	0
Anax imperator	LC	1	*Palpopleura portia*	LC	0
Anax tristis	LC	1	*Pantala flavescens*	LC	1
Azuragrion vansomereni	LC	0	*Parazyxomma flavicans*	LC	1
Brachythemis impartita	LC	0	*Phyllomacromia contumax*	LC	0
Brachythemis lacustris	LC	1	*Pseudagrion camerunense*	LC	1
Brachythemis leucosticta	LC	1	*Pseudagrion glaucescens*	LC	1
Ceriagrion glabrum	LC	0	*Pseudagrion hamoni*	LC	1
Ceriagrion suave	LC	1	*Pseudagrion nubicum*	LC	0
Chalcostephia flavifrons	LC	1	*Pseudagrion sjoestedti*	LC	1
Copera sikassoensis	LC	0	*Pseudagrion sublacteum*	LC	1
Crocothemis divisa	LC	1	*Pseudagrion sudanicum*	LC	2
Crocothemis erythraea	LC	1	*Rhyothemis notata*	LC	2
Crocothemis sanguinolenta	LC	1	*Rhyothemis semihyalina*	LC	1
Diplacodes lefebvrii	LC	1	*Sympetrum fonscolombii*	LC	0
Diplacodes luminans	LC	0	*Tetrathemis camerunensis*	LC	0
Elattoneura nigra	LC	1	*Tetrathemis polleni*	LC	1
Gynacantha manderica	LC	1	*Tholymis tillarga*	LC	0
Heliaeschna fuliginosa	LC	3	*Tramea basilaris*	LC	0
Hemistigma albipunctum	LC	0	*Tramea limbata*	LC	0
Ischnura senegalensis	LC	1	*Trithemis annulata*	LC	0
Lestes ictericus	LC	1	*Trithemis arteriosa*	LC	0
Lestes ochraceus	LC	1	*Trithemis grouti*	LC	2
Lestes pallidus	LC	1	*Trithemis hecate*	LC	1
Mesocnemis robusta	LC	3	*Trithemis imitata*	LC	1
Neurogomphus featheri	LC	3	*Trithemis kirbyi*	LC	0
Olpogastra lugubris	LC	1	*Trithetrum navasi*	LC	0
Orthetrum africanum	LC	2	*Urothemis assignata*	LC	0
Orthetrum angustiventre	LC	2	*Urothemis edwardsii*	LC	0
Orthetrum brachiale	LC	0	*Zygonyx torridus*	LC	1
Orthetrum chrysostigma	LC	1			

Ghana: (167 species, 1 900 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Aciagrion gracile	LC	2	*Diplacodes lefebvrii*	LC	1
Acisoma inflatum	LC	0	*Diplacodes luminans*	LC	0
Acisoma trifidum	LC	0	*Elattoneura balli*	LC	4
Aethiothemis incongruens	LC	5	*Elattoneura girardi*	LC	3
Aethriamanta rezia	LC	1	*Elattoneura nigra*	LC	1
Africallagma vaginale	LC	2	*Elattoneura villiersi*	LC	4
Agriocnemis exilis	LC	1	*Eleuthemis buettikoferi*	LC	2
Agriocnemis maclachlani	LC	2	*Gomphidia bredoi*	LC	2
Agriocnemis zerafica	LC	1	*Gomphidia gamblesi*	LC	3
Allocnemis elongata	LC	4	*Gynacantha africana*	LC	3
Allocnemis flavipennis	LC	4	*Gynacantha bullata*	LC	3
Allocnemis subnodalis	LC	5	*Gynacantha cylindrata*	LC	3
Anax ephippiger	LC	1	*Gynacantha manderica*	LC	1
Anax imperator	LC	1	*Gynacantha nigeriensis*	LC	3
Anax tristis	LC	1	*Gynacantha sextans*	LC	3
Atoconeura luxata	LC	3	*Gynacantha vesiculata*	LC	3
Azuragrion vansomereni	LC	0	*Hadrothemis camarensis*	LC	4
Brachythemis impartita	LC	0	*Hadrothemis coacta*	LC	2
Brachythemis lacustris	LC	1	*Hadrothemis defecta*	LC	1
Brachythemis leucosticta	LC	1	*Hadrothemis infesta*	LC	2
Bradinopyga strachani	LC	0	*Hadrothemis versuta*	LC	3
Ceriagrion bakeri	LC	2	*Heliaeschna fuliginosa*	LC	3
Ceriagrion corallinum	LC	0	*Hemistigma albipunctum*	LC	0
Ceriagrion glabrum	LC	0	*Ictinogomphus ferox*	LC	1
Ceriagrion ignitum	LC	3	*Ictinogomphus fraseri*	LC	2
Ceriagrion rubellocerinum	LC	4	*Ischnura senegalensis*	LC	1
Ceriagrion suave	LC	1	*Lestes dissimulans*	LC	0
Chalcostephia flavifrons	LC	1	*Lestes ochraceus*	LC	1
Chlorocypha curta	LC	3	*Lestes pallidus*	LC	1
Chlorocypha dispar	LC	5	*Lestes pinheyi*	LC	2
Chlorocypha luminosa	LC	4	*Lestinogomphus matilei*	LC	5
Chlorocypha pyriformosa	LC	2	*Mesocnemis robusta*	LC	3
Chlorocypha radix	LC	4	*Mesocnemis singularis*	LC	0
Chlorocypha rubida	LC	4	*Micromacromia zygoptera*	LC	4
Chlorocypha selysi	LC	5	*Neodythemis klingi*	LC	2
Copera guttifera	LC	4	*Nesciothemis minor*	LC	2
Copera sikassoensis	LC	0	*Nesciothemis pujoli*	LC	3
Crenigomphus renei	LC	0	*Neurogomphus fuscifrons*	LC	3
Crocothemis divisa	LC	1	*Notiothemis robertsi*	LC	3
Crocothemis erythraea	LC	1	*Olpogastra lugubris*	LC	1
Crocothemis sanguinolenta	LC	1	*Orthetrum abbotti*	LC	1
Cyanothemis simpsoni	LC	2	*Orthetrum africanum*	LC	2
Diastatomma gamblesi	LC	4	*Orthetrum angustiventre*	LC	2

Ghana: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Orthetrum austeni	LC	2	*Pseudagrion nubicum*	LC	0
Orthetrum brachiale	LC	0	*Pseudagrion sjoestedti*	LC	1
Orthetrum chrysostigma	LC	1	*Pseudagrion sublacteum*	LC	1
Orthetrum guineense	LC	1	*Pseudagrion sudanicum*	LC	2
Orthetrum hintzi	LC	1	*Pseudagrion torridum*	LC	1
Orthetrum icteromelas	LC	1	*Rhyothemis fenestrina*	LC	1
Orthetrum julia	LC	1	*Rhyothemis notata*	LC	2
Orthetrum microstigma	LC	0	*Rhyothemis semihyalina*	LC	1
Orthetrum monardi	LC	1	*Sapho bicolor*	LC	4
Orthetrum saegeri	LC	2	*Sapho ciliata*	LC	3
Orthetrum stemmale	LC	1	*Tetrathemis camerunensis*	LC	0
Orthetrum trinacria	LC	1	*Tetrathemis godiardi*	LC	4
Oxythemis phoenicosceles	LC	2	*Tetrathemis polleni*	LC	1
Palpopleura deceptor	LC	0	*Thermochoria equivocata*	LC	4
Palpopleura lucia	LC	0	*Tholymis tillarga*	LC	0
Palpopleura portia	LC	0	*Tramea basilaris*	LC	0
Pantala flavescens	LC	1	*Tramea limbata*	LC	0
Paragomphus genei	LC	1	*Trithemis aconita*	LC	0
Paragomphus nigroviridis	LC	3	*Trithemis annulata*	LC	0
Paragomphus serrulatus	LC	2	*Trithemis arteriosa*	LC	0
Parazyxomma flavicans	LC	1	*Trithemis basitincta*	LC	3
Phaon camerunensis	LC	2	*Trithemis bifida*	LC	0
Phaon iridipennis	LC	0	*Trithemis bredoi*	LC	2
Phyllogomphus aethiops	LC	2	*Trithemis dejouxi*	LC	3
Phyllogomphus moundi	LC	2	*Trithemis dichroa*	LC	2
Phyllomacromia contumax	LC	0	*Trithemis grouti*	LC	2
Phyllomacromia hervei	LC	1	*Trithemis imitata*	LC	1
Phyllomacromia melania	LC	3	*Trithemis kirbyi*	LC	0
Phyllomacromia sophia	LC	5	*Trithemis pruinata*	LC	1
Pseudagrion camerunense	LC	1	*Trithemis stictica*	LC	0
Pseudagrion emarginatum	LC	3	*Trithetrum navasi*	LC	0
Pseudagrion epiphonematicum	LC	3	*Umma cincta*	LC	2
Pseudagrion gigas	LC	3	*Urothemis assignata*	LC	0
Pseudagrion glaucescens	LC	1	*Urothemis edwardsii*	LC	0
Pseudagrion glaucoideum	LC	1	*Zygonoides fraseri*	LC	2
Pseudagrion glaucum	LC	2	*Zygonyx chrysobaphes*	LC	2
Pseudagrion hamoni	LC	1	*Zygonyx flavicosta*	LC	2
Pseudagrion hemicolon	LC	4	*Zygonyx geminuncus*	LC	4
Pseudagrion kersteni	LC	1	*Zygonyx natalensis*	LC	2
Pseudagrion malagasoides	LC	3	*Zygonyx torridus*	LC	1
Pseudagrion melanicterum	LC	0			

Guinea-Bissau: (64 species, 393 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Acisoma trifidum	LC	0	*Orthetrum guineense*	LC	1
Aethriamanta rezia	LC	1	*Orthetrum hintzi*	LC	1
Agriocnemis exilis	LC	1	*Orthetrum icteromelas*	LC	1
Agriocnemis maclachlani	LC	2	*Orthetrum julia*	LC	1
Agriocnemis victoria	LC	1	*Orthetrum microstigma*	LC	0
Agriocnemis zerafica	LC	1	*Orthetrum monardi*	LC	1
Anax ephippiger	LC	1	*Orthetrum stemmale*	LC	1
Brachythemis leucosticta	LC	1	*Orthetrum trinacria*	LC	1
Bradinopyga strachani	LC	0	*Palpopleura lucia*	LC	0
Ceriagrion corallinum	LC	0	*Palpopleura portia*	LC	0
Ceriagrion glabrum	LC	0	*Pantala flavescens*	LC	1
Ceriagrion suave	LC	1	*Parazyxomma flavicans*	LC	1
Chalcostephia flavifrons	LC	1	*Pseudagrion glaucum*	LC	2
Chlorocypha pyriformosa	LC	2	*Pseudagrion melanicterum*	LC	0
Chlorocypha rubida	LC	4	*Pseudagrion sjoestedti*	LC	1
Crocothemis divisa	LC	1	*Rhyothemis semihyalina*	LC	1
Crocothemis erythraea	LC	1	*Sapho fumosa*	LC	4
Crocothemis sanguinolenta	LC	1	*Tholymis tillarga*	LC	0
Diplacodes lefebvrii	LC	1	*Tramea basilaris*	LC	0
Diplacodes luminans	LC	0	*Trithemis aconita*	LC	0
Elattoneura nigra	LC	1	*Trithemis aenea*	LC	1
Gynacantha cylindrata	LC	3	*Trithemis annulata*	LC	0
Hadrothemis defecta	LC	1	*Trithemis arteriosa*	LC	0
Hemistigma albipunctum	LC	0	*Trithemis grouti*	LC	2
Ischnura senegalensis	LC	1	*Trithemis hecate*	LC	1
Neodythemis klingi	LC	2	*Trithemis imitata*	LC	1
Nesciothemis nigeriensis	LC	2	*Trithemis kalula*	LC	2
Orthetrum abbotti	LC	1	*Trithemis kirbyi*	LC	0
Orthetrum africanum	LC	2	*Urothemis assignata*	LC	0
Orthetrum angustiventre	LC	2	*Urothemis edwardsii*	LC	0
Orthetrum brachiale	LC	0	*Zygonyx torridus*	LC	1
Orthetrum chrysostigma	LC	1	*Zyxomma atlanticum*	LC	3

Guinea: (107 species, 431 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Aciagrion africanum	LC	2	*Africallagma subtile*	LC	0
Aciagrion gracile	LC	2	*Agriocnemis victoria*	LC	1
Acisoma inflatum	LC	0	*Allocnemis elongata*	LC	4
Acisoma trifidum	LC	0	*Allocnemis flavipennis*	LC	4
Aethriamanta rezia	LC	1	*Allocnemis subnodalis*	LC	5

Guinea: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Anax imperator	LC	1	*Micromacromia zygoptera*	LC	4
Anax tristis	LC	1	*Neodythemis campioni*	LC	4
Atoconeura luxata	LC	3	*Neodythemis klingi*	LC	2
Ceriagrion glabrum	LC	0	*Neophya rutherfordi*	LC	3
Ceriagrion rubellocerinum	LC	4	*Nesciothemis minor*	LC	2
Ceriagrion suave	LC	1	*Nesciothemis pujoli*	LC	3
Ceriagrion whellani	LC	2	*Notiothemis robertsi*	LC	3
Chalcostephia flavifrons	LC	1	*Olpogastra lugubris*	LC	1
Chlorocypha curta	LC	3	*Orthetrum abbotti*	LC	1
Chlorocypha dispar	LC	5	*Orthetrum africanum*	LC	2
Chlorocypha luminosa	LC	4	*Orthetrum austeni*	LC	2
Chlorocypha radix	LC	4	*Orthetrum brachiale*	LC	0
Chlorocypha selysi	LC	5	*Orthetrum guineense*	LC	1
Copera sikassoensis	LC	0	*Orthetrum hintzi*	LC	1
Cornigomphus mariannae	LC	5	*Orthetrum julia*	LC	1
Crenigomphus renei	LC	0	*Orthetrum latihami*	LC	2
Crocothemis divisa	LC	1	*Orthetrum microstigma*	LC	0
Crocothemis erythraea	LC	1	*Orthetrum stemmale*	LC	1
Crocothemis sanguinolenta	LC	1	*Palpopleura lucia*	LC	0
Cyanothemis simpsoni	LC	2	*Palpopleura portia*	LC	0
Diastatomma gamblesi	LC	4	*Pantala flavescens*	LC	1
Diplacodes lefebvrii	LC	1	*Paragomphus kiautai*	LC	3
Elattoneura balli	LC	4	*Paragomphus tournieri*	LC	5
Elattoneura girardi	LC	3	*Phaon camerunensis*	LC	2
Elattoneura nigra	LC	1	*Phaon iridipennis*	LC	0
Elattoneura villiersi	LC	4	*Phyllogomphus moundi*	LC	2
Gomphidia gamblesi	LC	3	*Phyllomacromia aeneothorax*	LC	4
Gynacantha bullata	LC	3	*Phyllomacromia lamottei*	NT	6
Gynacantha manderica	LC	1	*Phyllomacromia melania*	LC	3
Gynacantha sextans	LC	3	*Phyllomacromia sophia*	LC	5
Gynacantha vesiculata	LC	3	*Pseudagrion epiphonematicum*	LC	3
Hadrothemis camarensis	LC	4	*Pseudagrion gigas*	LC	3
Hadrothemis defecta	LC	1	*Pseudagrion hamoni*	LC	1
Hadrothemis infesta	LC	2	*Pseudagrion hemicolon*	LC	4
Hadrothemis versuta	LC	3	*Pseudagrion melanicterum*	LC	0
Hemistigma albipunctum	LC	0	*Pseudagrion sublacteum*	LC	1
Idomacromia proavita	LC	4	*Sapho bicolor*	LC	4
Lestes dissimulans	LC	0	*Sapho ciliata*	LC	3
Libyogomphus christinae	LC	5	*Sapho fumosa*	LC	4
Malgassophlebia bispina	LC	3	*Tetrathemis camerunensis*	LC	0
Mesocnemis singularis	LC	0	*Tetrathemis godiardi*	LC	4

Guinea: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Thermochoria equivocata	LC	4	*Trithemis pruinata*	LC	1
Tholymis tillarga	LC	0	*Umma cincta*	LC	2
Trithemis aconita	LC	0	*Urothemis assignata*	LC	0
Trithemis arteriosa	LC	0	*Zygonyx chrysobaphes*	LC	2
Trithemis dejouxi	LC	3	*Zygonyx flavicosta*	LC	2
Trithemis dichroa	LC	2	*Zygonyx geminuncus*	LC	4
Trithemis grouti	LC	2	*Zygonyx torridus*	LC	1
Trithemis kalula	LC	2			

Kenya: (163 species, 2 918 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Aethriamanta rezia	LC	1	*Ceriagrion suave*	LC	1
Africallagma elongatum	LC	3	*Ceriagrion varians*	LC	4
Africallagma glaucum	LC	3	*Chalcostephia flavifrons*	LC	1
Africallagma pseudelongatum	LC	3	*Chlorocypha curta*	LC	3
Africallagma subtile	LC	0	*Coryphagrion grandis*	VU	7
Agriocnemis exilis	LC	1	*Crenigomphus hartmanni*	LC	2
Agriocnemis gratiosa	LC	2	*Crenigomphus renei*	LC	0
Agriocnemis inversa	LC	4	*Crocothemis erythraea*	LC	1
Agriocnemis sania	LC	3	*Crocothemis sanguinolenta*	LC	1
Allocnemis abbotti	NT	5	*Diplacodes lefebvrii*	LC	1
Allocnemis pauli	LC	4	*Diplacodes luminans*	LC	0
Anaciaeschna triangulifera	LC	1	*Elattoneura glauca*	LC	2
Anax ephippiger	LC	1	*Gomphidia quarrei*	LC	2
Anax imperator	LC	1	*Gynacantha bullata*	LC	3
Anax speratus	LC	2	*Gynacantha manderica*	LC	1
Anax tristis	LC	1	*Gynacantha usambarica*	LC	3
Atoconeura biordinata	LC	3	*Gynacantha villosa*	LC	3
Atoconeura eudoxia	LC	4	*Hadrothemis camarensis*	LC	4
Atoconeura kenya	LC	3	*Hadrothemis scabrifrons*	LC	4
Azuragrion nigridorsum	LC	2	*Hemistigma albipunctum*	LC	0
Brachythemis impartita	LC	0	*Ictinogomphus ferox*	LC	1
Brachythemis lacustris	LC	1	*Ischnura senegalensis*	LC	1
Brachythemis leucosticta	LC	1	*Lestes dissimulans*	LC	0
Brachythemis wilsoni	LC	2	*Lestes ictericus*	LC	1
Bradinopyga cornuta	LC	2	*Lestes pallidus*	LC	1
Bradinopyga strachani	LC	0	*Lestes plagiatus*	LC	2
Ceriagrion glabrum	LC	0	*Lestes tridens*	LC	0
Ceriagrion kordofanicum	LC	4	*Lestes uncifer*	LC	2

Kenya: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Lestes virgatus	LC	2	*Paragomphus sabicus*	LC	2
Lestinogomphus angustus	LC	2	*Paragomphus viridior*	LC	3
Mesocnemis singularis	LC	0	*Phaon iridipennis*	LC	0
Microgomphus nyassicus	LC	5	*Phyllogomphus selysi*	LC	2
Micromacromia camerunica	LC	2	*Phyllomacromia contumax*	LC	0
Nesciothemis farinosa	LC	1	*Phyllomacromia monoceros*	LC	4
Neurogomphus featheri	LC	3	*Phyllomacromia pallidinervis*	LC	3
Notiothemis jonesi	LC	3	*Phyllomacromia picta*	LC	2
Notiothemis robertsi	LC	3	*Phyllomacromia sylvatica*	LC	5
Notogomphus dorsalis	LC	2	*Pinheyschna meruensis*	LC	4
Notogomphus kilimandjaricus	LC	4	*Pinheyschna rileyi*	LC	3
Notogomphus lecythus	LC	2	*Platycypha amboniensis*	CR	8
Notogomphus leroyi	LC	4	*Platycypha caligata*	LC	2
Notogomphus lujai	LC	4	*Platycypha lacustris*	LC	3
Notogomphus maathaiae	EN	9	*Proischnura subfurcata*	LC	2
Olpogastra lugubris	LC	1	*Pseudagrion bicoerulans*	VU	6
Onychogomphus styx	LC	2	*Pseudagrion commoniae*	LC	3
Orthetrum abbotti	LC	1	*Pseudagrion gamblesi*	LC	2
Orthetrum brachiale	LC	0	*Pseudagrion glaucescens*	LC	1
Orthetrum caffrum	LC	3	*Pseudagrion hageni*	LC	2
Orthetrum camerunense	LC	3	*Pseudagrion hamoni*	LC	1
Orthetrum chrysostigma	LC	1	*Pseudagrion kersteni*	LC	1
Orthetrum guineense	LC	1	*Pseudagrion kibalense*	LC	4
Orthetrum hintzi	LC	1	*Pseudagrion lindicum*	LC	3
Orthetrum icteromelas	LC	1	*Pseudagrion massaicum*	LC	3
Orthetrum julia	LC	1	*Pseudagrion niloticum*	LC	3
Orthetrum machadoi	LC	1	*Pseudagrion nubicum*	LC	0
Orthetrum microstigma	LC	0	*Pseudagrion salisburyense*	LC	2
Orthetrum monardi	LC	1	*Pseudagrion sjoestedti*	LC	1
Orthetrum stemmale	LC	1	*Pseudagrion spernatum*	LC	2
Orthetrum trinacria	LC	1	*Pseudagrion sublacteum*	LC	1
Palpopleura deceptor	LC	0	*Pseudagrion torridum*	LC	1
Palpopleura jucunda	LC	0	*Rhyothemis fenestrina*	LC	1
Palpopleura lucia	LC	0	*Rhyothemis semihyalina*	LC	1
Palpopleura portia	LC	0	*Stenocypha tenuis*	LC	4
Pantala flavescens	LC	1	*Sympetrum fonscolombii*	LC	0
Paragomphus alluaudi	LC	3	*Teinobasis alluaudi*	LC	4
Paragomphus cognatus	LC	2	*Tetrathemis corduliformis*	LC	4
Paragomphus elpidius	LC	2	*Tetrathemis polleni*	LC	1
Paragomphus genei	LC	1	*Thermochoria jeanneli*	LC	4
Paragomphus magnus	LC	3	*Tholymis tillarga*	LC	0
Paragomphus pumilio	LC	2	*Tramea basilaris*	LC	0

Kenya: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Tramea limbata	LC	0	*Trithemis stictica*	LC	0
Trithemis aconita	LC	0	*Trithemis werneri*	LC	2
Trithemis annulata	LC	0	*Trithetrum navasi*	LC	0
Trithemis arteriosa	LC	0	*Umma saphirina*	LC	3
Trithemis bifida	LC	0	*Urothemis assignata*	LC	0
Trithemis donaldsoni	LC	3	*Urothemis edwardsii*	LC	0
Trithemis dorsalis	LC	3	*Zosteraeschna ellioti*	LC	3
Trithemis furva	LC	2	*Zosteraeschna usambarica*	LC	4
Trithemis hecate	LC	1	*Zygonoides fuelleborni*	LC	2
Trithemis imitata	LC	1	*Zygonyx natalensis*	LC	2
Trithemis kirbyi	LC	0	*Zygonyx torridus*	LC	1
Trithemis pluvialis	LC	2			

Lesotho: (12 species, 15 records)

Species	RL	ADBI scores
Africallagma glaucum	LC	3
Africallagma sapphirinum	LC	3
Chlorolestes fasciatus	LC	4
Elattoneura glauca	LC	2
Ischnura senegalensis	LC	1
Orthetrum caffrum	LC	3
Proischnura rotundipennis	LC	4
Pseudagrion citricola	LC	4
Pseudagrion draconis	LC	4
Pseudagrion vaalense	LC	3
Sympetrum fonscolombii	LC	0
Trithemis furva	LC	2

Liberia: (185 species, 4 054 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Aciagrion africanum	LC	2	*Aethriamanta rezia*	LC	1
Aciagrion gracile	LC	2	*Africallagma subtile*	LC	0
Acisoma inflatum	LC	0	*Agriocnemis angustirami*	LC	4
Acisoma trifidum	LC	0	*Agriocnemis exilis*	LC	1
Aethiothemis bella	LC	2	*Agriocnemis maclachlani*	LC	2
Aethiothemis incongruens	LC	5	*Agriocnemis victoria*	LC	1
Aethiothemis mediofasciata	LC	2	*Agriocnemis zerafica*	LC	1
Aethiothemis solitaria	LC	1	*Allocnemis elongata*	LC	4

Liberia: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Allocnemis flavipennis	LC	4	*Eleuthemis buettikoferi*	LC	2
Allocnemis subnodalis	LC	5	*Gomphidia gamblesi*	LC	3
Anax chloromelas	LC	2	*Gynacantha africana*	LC	3
Anax imperator	LC	1	*Gynacantha bullata*	LC	3
Anax rutherfordi	LC	4	*Gynacantha cylindrata*	LC	3
Anax tristis	LC	1	*Gynacantha nigeriensis*	LC	3
Atoconeura luxata	LC	3	*Gynacantha sextans*	LC	3
Azuragrion vansomereni	LC	0	*Gynacantha vesiculata*	LC	3
Brachythemis impartita	LC	0	*Hadrothemis camarensis*	LC	4
Brachythemis lacustris	LC	1	*Hadrothemis coacta*	LC	2
Bradinopyga strachani	LC	0	*Hadrothemis defecta*	LC	1
Ceriagrion bakeri	LC	2	*Hadrothemis infesta*	LC	2
Ceriagrion corallinum	LC	0	*Hadrothemis versuta*	LC	3
Ceriagrion glabrum	LC	0	*Heliaeschna fuliginosa*	LC	3
Ceriagrion rubellocerinum	LC	4	*Heliaeschna sembe*	LC	3
Ceriagrion suave	LC	1	*Hemistigma albipunctum*	LC	0
Ceriagrion tricrenaticeps	LC	2	*Ictinogomphus ferox*	LC	1
Ceriagrion whellani	LC	2	*Ictinogomphus fraseri*	LC	2
Chalcostephia flavifrons	LC	1	*Idomacromia proavita*	LC	4
Chlorocypha curta	LC	3	*Ischnura senegalensis*	LC	1
Chlorocypha cyanifrons	LC	4	*Lestes dissimulans*	LC	0
Chlorocypha dispar	LC	5	*Lestes tridens*	LC	0
Chlorocypha luminosa	LC	4	*Lestinogomphus matilei*	LC	5
Chlorocypha pyriformosa	LC	2	*Libyogomphus christinae*	LC	5
Chlorocypha radix	LC	4	*Malgassophlebia bispina*	LC	3
Chlorocypha rubida	LC	4	*Mesocnemis singularis*	LC	0
Chlorocypha selysi	LC	5	*Mesocnemis tisi*	EN	8
Copera guttifera	LC	4	*Micromacromia camerunica*	LC	2
Copera sikassoensis	LC	0	*Micromacromia zygoptera*	LC	4
Cornigomphus mariannae	LC	5	*Neodythemis campioni*	LC	4
Crocothemis divisa	LC	1	*Neodythemis klingi*	LC	2
Crocothemis erythraea	LC	1	*Neophya rutherfordi*	LC	3
Crocothemis sanguinolenta	LC	1	*Nesciothemis minor*	LC	2
Cyanothemis simpsoni	LC	2	*Nesciothemis nigeriensis*	LC	2
Diastatomma gamblesi	LC	4	*Nesciothemis pujoli*	LC	3
Diplacodes deminuta	LC	3	*Notiothemis robertsi*	LC	3
Diplacodes lefebvrii	LC	1	*Olpogastra lugubris*	LC	1
Diplacodes luminans	LC	0	*Orthetrum abbotti*	LC	1
Elattoneura balli	LC	4	*Orthetrum africanum*	LC	2
Elattoneura girardi	LC	3	*Orthetrum angustiventre*	LC	2
Elattoneura nigra	LC	1	*Orthetrum austeni*	LC	2
Elattoneura villiersi	LC	4	*Orthetrum brachiale*	LC	0

Liberia: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Orthetrum chrysostigma	LC	1	*Pseudagrion isidromorai*	LC	2
Orthetrum guineense	LC	1	*Pseudagrion kersteni*	LC	1
Orthetrum hintzi	LC	1	*Pseudagrion malagasoides*	LC	3
Orthetrum icteromelas	LC	1	*Pseudagrion melanicterum*	LC	0
Orthetrum julia	LC	1	*Pseudagrion nubicum*	LC	0
Orthetrum latihami	LC	2	*Pseudagrion sjoestedti*	LC	1
Orthetrum microstigma	LC	0	*Pseudagrion sublacteum*	LC	1
Orthetrum monardi	LC	1	*Rhyothemis fenestrina*	LC	1
Orthetrum saegeri	LC	2	*Rhyothemis notata*	LC	2
Orthetrum stemmale	LC	1	*Rhyothemis semihyalina*	LC	1
Orthetrum trinacria	LC	1	*Sapho bicolor*	LC	4
Oxythemis phoenicosceles	LC	2	*Sapho ciliata*	LC	3
Palpopleura deceptor	LC	0	*Sapho fumosa*	LC	4
Palpopleura lucia	LC	0	*Tetrathemis camerunensis*	LC	0
Palpopleura portia	LC	0	*Tetrathemis godiardi*	LC	4
Pantala flavescens	LC	1	*Tetrathemis polleni*	LC	1
Paragomphus genei	LC	1	*Thermochoria equivocata*	LC	4
Paragomphus kiautai	LC	3	*Tholymis tillarga*	LC	0
Paragomphus nigroviridis	LC	3	*Tramea basilaris*	LC	0
Paragomphus serrulatus	LC	2	*Tramea limbata*	LC	0
Paragomphus tournieri	LC	5	*Trithemis aconita*	LC	0
Parazyxomma flavicans	LC	1	*Trithemis aenea*	LC	1
Phaon camerunensis	LC	2	*Trithemis africana*	LC	4
Phaon iridipennis	LC	0	*Trithemis annulata*	LC	0
Phyllogomphus moundi	LC	2	*Trithemis arteriosa*	LC	0
Phyllomacromia aeneothorax	LC	4	*Trithemis basitincta*	LC	3
Phyllomacromia contumax	LC	0	*Trithemis dejouxi*	LC	3
Phyllomacromia hervei	LC	1	*Trithemis dichroa*	LC	2
Phyllomacromia lamottei	NT	6	*Trithemis grouti*	LC	2
Phyllomacromia melania	LC	3	*Trithemis hecate*	LC	1
Phyllomacromia occidentalis	LC	5	*Trithemis imitata*	LC	1
Phyllomacromia sophia	LC	5	*Trithemis kalula*	LC	2
Porpax bipunctus	LC	4	*Trithemis kirbyi*	LC	0
Pseudagrion camerunense	LC	1	*Trithemis stictica*	LC	0
Pseudagrion cyathiforme	LC	4	*Trithetrum navasi*	LC	0
Pseudagrion epiphonematicum	LC	3	*Umma cincta*	LC	2
Pseudagrion glaucescens	LC	1	*Urothemis assignata*	LC	0
Pseudagrion glaucoideum	LC	1	*Urothemis edwardsii*	LC	0
Pseudagrion glaucum	LC	2	*Zygonyx chrysobaphes*	LC	2
Pseudagrion hamoni	LC	1	*Zygonyx flavicosta*	LC	2
Pseudagrion hemicolon	LC	4	*Zygonyx geminuncus*	LC	4

Liberia: (*continued*)

Species	RL	ADBI scores
Zygonyx natalensis	LC	2
Zygonyx torridus	LC	1
Zyxomma atlanticum	LC	3

Libya: (28 species, 309 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Acisoma inflatum	LC	0	*Orthetrum chrysostigma*	LC	1
Agriocnemis sania	LC	3	*Orthetrum coerulescens*	LC	3
Anax ephippiger	LC	1	*Orthetrum nitidinerve*	LC	4
Anax imperator	LC	1	*Orthetrum ransonnetii*	LC	1
Anax parthenope	LC	1	*Orthetrum sabina*	LC	1
Brachythemis impartita	LC	0	*Orthetrum trinacria*	LC	1
Coenagrion caerulescens	LC	4	*Pseudagrion hamoni*	LC	1
Crocothemis erythraea	LC	1	*Selysiothemis nigra*	LC	2
Diplacodes lefebvrii	LC	1	*Sympetrum fonscolombii*	LC	0
Ischnura fountaineae	LC	3	*Sympetrum sanguineum*	LC	3
Ischnura graellsii	LC	4	*Sympetrum sinaiticum*	LC	2
Ischnura saharensis	LC	3	*Trithemis annulata*	LC	0
Ischnura senegalensis	LC	1	*Trithemis arteriosa*	LC	0
Lestes barbarus	LC	4	*Trithemis kirbyi*	LC	0

Malawi: (144 species, 2 727 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Aciagrion africanum	LC	2	*Anax chloromelas*	LC	2
Aciagrion gracile	LC	2	*Anax ephippiger*	LC	1
Aciagrion steeleae	LC	4	*Anax imperator*	LC	1
Aethiothemis bequaerti	LC	3	*Anax speratus*	LC	2
Aethiothemis solitaria	LC	1	*Anax tristis*	LC	1
Aethriamanta rezia	LC	1	*Atoconeura biordinata*	LC	3
Africallagma fractum	LC	4	*Azuragrion nigridorsum*	LC	2
Africallagma glaucum	LC	3	*Brachythemis lacustris*	LC	1
Africallagma pallidulum	LC	4	*Brachythemis leucosticta*	LC	1
Africallagma sinuatum	LC	4	*Bradinopyga cornuta*	LC	2
Africallagma subtile	LC	0	*Ceriagrion glabrum*	LC	0
Agriocnemis exilis	LC	1	*Ceriagrion suave*	LC	1
Agriocnemis gratiosa	LC	2	*Chalcostephia flavifrons*	LC	1
Allocnemis marshalli	LC	5	*Chlorocypha consueta*	LC	2
Anaciaeschna triangulifera	LC	1	*Chlorolestes elegans*	NT	5

Malawi: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Crenigomphus hartmanni	LC	2	*Orthetrum brachiale*	LC	0
Crocothemis divisa	LC	1	*Orthetrum caffrum*	LC	3
Crocothemis erythraea	LC	1	*Orthetrum chrysostigma*	LC	1
Crocothemis sanguinolenta	LC	1	*Orthetrum guineense*	LC	1
Crocothemis saxicolor	LC	3	*Orthetrum hintzi*	LC	1
Diplacodes deminuta	LC	3	*Orthetrum icteromelas*	LC	1
Diplacodes lefebvrii	LC	1	*Orthetrum julia*	LC	1
Diplacodes luminans	LC	0	*Orthetrum machadoi*	LC	1
Elattoneura cellularis	LC	3	*Orthetrum stemmale*	LC	1
Elattoneura glauca	LC	2	*Orthetrum trinacria*	LC	1
Gomphidia quarrei	LC	2	*Palpopleura deceptor*	LC	0
Gynacantha bullata	LC	3	*Palpopleura jucunda*	LC	0
Gynacantha immaculifrons	LC	4	*Palpopleura lucia*	LC	0
Gynacantha manderica	LC	1	*Palpopleura portia*	LC	0
Gynacantha usambarica	LC	3	*Pantala flavescens*	LC	1
Gynacantha vesiculata	LC	3	*Paragomphus cognatus*	LC	2
Gynacantha villosa	LC	3	*Paragomphus elpidius*	LC	2
Hadrothemis scabrifrons	LC	4	*Paragomphus genei*	LC	1
Hemicordulia africana	LC	3	*Paragomphus nyasicus*	NT	4
Hemistigma albipunctum	LC	0	*Paragomphus sabicus*	LC	2
Ictinogomphus ferox	LC	1	*Phaon iridipennis*	LC	0
Ischnura senegalensis	LC	1	*Phyllogomphus selysi*	LC	2
Lestes amicus	LC	3	*Phyllomacromia contumax*	LC	0
Lestes dissimulans	LC	0	*Phyllomacromia monoceros*	LC	4
Lestes ictericus	LC	1	*Phyllomacromia picta*	LC	2
Lestes ochraceus	LC	1	*Pinheyschna rileyi*	LC	3
Lestes pallidus	LC	1	*Platycypha caligata*	LC	2
Lestes pinheyi	LC	2	*Porpax risi*	LC	3
Lestes plagiatus	LC	2	*Proischnura subfurcata*	LC	2
Lestes uncifer	LC	2	*Pseudagrion acaciae*	LC	2
Lestes virgatus	LC	2	*Pseudagrion coeleste*	LC	2
Lestinogomphus angustus	LC	2	*Pseudagrion commoniae*	LC	3
Mesocnemis singularis	LC	0	*Pseudagrion gamblesi*	LC	2
Nepogomphoides stuhlmanni	VU	6	*Pseudagrion glaucescens*	LC	1
Nesciothemis farinosa	LC	1	*Pseudagrion hageni*	LC	2
Notiothemis jonesi	LC	3	*Pseudagrion hamoni*	LC	1
Notogomphus dendrohyrax	LC	3	*Pseudagrion inconspicuum*	LC	3
Notogomphus praetorius	LC	2	*Pseudagrion kersteni*	LC	1
Notogomphus zernyi	LC	3	*Pseudagrion massaicum*	LC	3
Olpogastra lugubris	LC	1	*Pseudagrion nubicum*	LC	0
Oreocnemis phoenix	CR	9	*Pseudagrion salisburyense*	LC	2
Orthetrum abbotti	LC	1	*Pseudagrion sjoestedti*	LC	1

Malawi: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Pseudagrion spernatum	LC	2	*Trithemis furva*	LC	2
Pseudagrion sublacteum	LC	1	*Trithemis hecate*	LC	1
Pseudagrion sudanicum	LC	2	*Trithemis kirbyi*	LC	0
Rhyothemis fenestrina	LC	1	*Trithemis monardi*	LC	4
Rhyothemis semihyalina	LC	1	*Trithemis pluvialis*	LC	2
Sympetrum fonscolombii	LC	0	*Trithemis stictica*	LC	0
Teinobasis alluaudi	LC	4	*Trithemis werneri*	LC	2
Tetrathemis polleni	LC	1	*Trithetrum navasi*	LC	0
Thermochoria equivocata	LC	4	*Umma declivium*	VU	6
Tholymis tillarga	LC	0	*Urothemis assignata*	LC	0
Tramea basilaris	LC	0	*Urothemis edwardsii*	LC	0
Trithemis aconita	LC	0	*Zosteraeschna usambarica*	LC	4
Trithemis annulata	LC	0	*Zygonoides fuelleborni*	LC	2
Trithemis arteriosa	LC	0	*Zygonyx natalensis*	LC	2
Trithemis donaldsoni	LC	3	*Zygonyx torridus*	LC	1

Mali: (71 species, 416 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Aethriamanta rezia	LC	1	*Elattoneura nigra*	LC	1
Africallagma subtile	LC	0	*Elattoneura vittata*	LC	4
Agriocnemis exilis	LC	1	*Hemistigma albipunctum*	LC	0
Agriocnemis maclachlani	LC	2	*Ictinogomphus ferox*	LC	1
Agriocnemis zerafica	LC	1	*Ischnura senegalensis*	LC	1
Anax ephippiger	LC	1	*Lestes ictericus*	LC	1
Anax imperator	LC	1	*Lestes pallidus*	LC	1
Azuragrion vansomereni	LC	0	*Mesocnemis singularis*	LC	0
Brachythemis lacustris	LC	1	*Olpogastra lugubris*	LC	1
Brachythemis leucosticta	LC	1	*Orthetrum abbotti*	LC	1
Bradinopyga strachani	LC	0	*Orthetrum angustiventre*	LC	2
Ceriagrion glabrum	LC	0	*Orthetrum brachiale*	LC	0
Ceriagrion suave	LC	1	*Orthetrum chrysostigma*	LC	1
Chalcostephia flavifrons	LC	1	*Orthetrum hintzi*	LC	1
Chlorocypha curta	LC	3	*Orthetrum microstigma*	LC	0
Chlorocypha dispar	LC	5	*Orthetrum stemmale*	LC	1
Copera sikassoensis	LC	0	*Orthetrum trinacria*	LC	1
Crenigomphus renei	LC	0	*Palpopleura deceptor*	LC	0
Crocothemis erythraea	LC	1	*Palpopleura jucunda*	LC	0
Crocothemis sanguinolenta	LC	1	*Palpopleura lucia*	LC	0
Diplacodes lefebvrii	LC	1	*Palpopleura portia*	LC	0
Diplacodes luminans	LC	0	*Pantala flavescens*	LC	1

Mali: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Paragomphus genei	LC	1	*Tramea limbata*	LC	0
Parazyxomma flavicans	LC	1	*Trithemis annulata*	LC	0
Phaon iridipennis	LC	0	*Trithemis arteriosa*	LC	0
Phyllomacromia contumax	LC	0	*Trithemis dejouxi*	LC	3
Pseudagrion gigas	LC	3	*Trithemis dichroa*	LC	2
Pseudagrion glaucescens	LC	1	*Trithemis hecate*	LC	1
Pseudagrion hamoni	LC	1	*Trithemis imitata*	LC	1
Pseudagrion kersteni	LC	1	*Trithemis kalula*	LC	2
Pseudagrion nubicum	LC	0	*Trithemis kirbyi*	LC	0
Pseudagrion sjoestedti	LC	1	*Urothemis assignata*	LC	0
Pseudagrion sublacteum	LC	1	*Urothemis edwardsii*	LC	0
Pseudagrion torridum	LC	1	*Zygonyx natalensis*	LC	2
Tholymis tillarga	LC	0	*Zygonyx torridus*	LC	1
Tramea basilaris	LC	0			

Mauritania: (24 species, 255 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Agriocnemis zerafica	LC	1	*Orthetrum chrysostigma*	LC	1
Anax ephippiger	LC	1	*Orthetrum ransonnetii*	LC	1
Anax imperator	LC	1	*Orthetrum trinacria*	LC	1
Anax parthenope	LC	1	*Palpopleura deceptor*	LC	0
Azuragrion vansomereni	LC	0	*Pantala flavescens*	LC	1
Brachythemis impartita	LC	0	*Pseudagrion hamoni*	LC	1
Brachythemis leucosticta	LC	1	*Sympetrum fonscolombii*	LC	0
Crocothemis erythraea	LC	1	*Tramea basilaris*	LC	0
Diplacodes lefebvrii	LC	1	*Trithemis annulata*	LC	0
Ischnura saharensis	LC	3	*Trithemis arteriosa*	LC	0
Ischnura senegalensis	LC	1	*Trithemis kirbyi*	LC	0
Lestes pallidus	LC	1	*Urothemis edwardsii*	LC	0

Morocco: (60 species, 4 188 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Aeshna affinis	LC	4	*Anax parthenope*	LC	1
Aeshna cyanea	LC	3	*Boyeria irene*	LC	3
Aeshna isoceles	LC	4	*Brachythemis impartita*	LC	0
Aeshna mixta	LC	2	*Calopteryx exul*	CR	7
Anax ephippiger	LC	1	*Calopteryx haemorrhoidalis*	LC	3
Anax imperator	LC	1	*Calopteryx virgo*	LC	3

Morocco: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Ceriagrion tenellum	LC	4	*Orthetrum brunneum*	LC	4
Chalcolestes viridis	LC	3	*Orthetrum cancellatum*	LC	4
Coenagrion caerulescens	LC	4	*Orthetrum chrysostigma*	LC	1
Coenagrion mercuriale	NT	5	*Orthetrum coerulescens*	LC	3
Coenagrion puella	LC	4	*Orthetrum nitidinerve*	LC	4
Coenagrion scitulum	LC	4	*Orthetrum ransonnetii*	LC	1
Cordulegaster boltonii	LC	4	*Orthetrum sabina*	LC	1
Cordulegaster princeps	LC	5	*Orthetrum trinacria*	LC	1
Crocothemis erythraea	LC	1	*Pantala flavescens*	LC	1
Diplacodes lefebvrii	LC	1	*Paragomphus genei*	LC	1
Enallagma deserti	LC	4	*Platycnemis subdilatata*	LC	3
Erythromma lindenii	LC	4	*Pseudagrion sublacteum*	LC	1
Erythromma viridulum	LC	4	*Pyrrhosoma nymphula*	LC	4
Ischnura fountaineae	LC	3	*Selysiothemis nigra*	LC	2
Ischnura graellsii	LC	4	*Sympecma fusca*	LC	2
Ischnura pumilio	LC	4	*Sympetrum fonscolombii*	LC	0
Ischnura saharensis	LC	3	*Sympetrum meridionale*	LC	4
Lestes barbarus	LC	4	*Sympetrum sanguineum*	LC	3
Lestes dryas	LC	5	*Sympetrum sinaiticum*	LC	2
Lestes virens	LC	2	*Sympetrum striolatum*	LC	3
Libellula quadrimaculata	LC	5	*Trithemis annulata*	LC	0
Onychogomphus costae	NT	4	*Trithemis arteriosa*	LC	0
Onychogomphus forcipatus	LC	3	*Trithemis kirbyi*	LC	0
Onychogomphus uncatus	LC	3	*Zygonyx torridus*	LC	1

Mozambique: (137 species, 1 956 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Aciagrion dondoense	LC	3	*Anaciaeschna triangulifera*	LC	1
Aciagrion gracile	LC	2	*Anax chloromelas*	LC	2
Acisoma variegatum	LC	3	*Anax ephippiger*	LC	1
Aethiothemis bequaerti	LC	3	*Anax imperator*	LC	1
Aethriamanta rezia	LC	1	*Anax speratus*	LC	2
Africallagma fractum	LC	4	*Anax tristis*	LC	1
Africallagma glaucum	LC	3	*Atoconeura biordinata*	LC	3
Africallagma sinuatum	LC	4	*Azuragrion nigridorsum*	LC	2
Africallagma subtile	LC	0	*Brachythemis lacustris*	LC	1
Agriocnemis exilis	LC	1	*Brachythemis leucosticta*	LC	1
Agriocnemis gratiosa	LC	2	*Bradinopyga cornuta*	LC	2
Allocnemis marshalli	LC	5	*Ceratogomphus pictus*	LC	3

Mozambique: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Ceriagrion glabrum	LC	0	*Orthetrum brachiale*	LC	0
Ceriagrion suave	LC	1	*Orthetrum caffrum*	LC	3
Chalcostephia flavifrons	LC	1	*Orthetrum chrysostigma*	LC	1
Chlorocypha consueta	LC	2	*Orthetrum guineense*	LC	1
Chlorolestes elegans	NT	5	*Orthetrum hintzi*	LC	1
Crenigomphus hartmanni	LC	2	*Orthetrum icteromelas*	LC	1
Crocothemis divisa	LC	1	*Orthetrum julia*	LC	1
Crocothemis erythraea	LC	1	*Orthetrum machadoi*	LC	1
Crocothemis sanguinolenta	LC	1	*Orthetrum macrostigma*	LC	4
Crocothemis saxicolor	LC	3	*Orthetrum stemmale*	LC	1
Diplacodes lefebvrii	LC	1	*Orthetrum trinacria*	LC	1
Diplacodes luminans	LC	0	*Palpopleura deceptor*	LC	0
Elattoneura glauca	LC	2	*Palpopleura jucunda*	LC	0
Gomphidia quarrei	LC	2	*Palpopleura lucia*	LC	0
Gynacantha manderica	LC	1	*Palpopleura portia*	LC	0
Gynacantha usambarica	LC	3	*Pantala flavescens*	LC	1
Gynacantha villosa	LC	3	*Paragomphus cognatus*	LC	2
Hadrothemis scabrifrons	LC	4	*Paragomphus genei*	LC	1
Hemicordulia africana	LC	3	*Paragomphus magnus*	LC	3
Hemistigma albipunctum	LC	0	*Paragomphus sabicus*	LC	2
Ictinogomphus ferox	LC	1	*Phaon iridipennis*	LC	0
Ischnura senegalensis	LC	1	*Phyllomacromia contumax*	LC	0
Lestes amicus	LC	3	*Phyllomacromia monoceros*	LC	4
Lestes dissimulans	LC	0	*Phyllomacromia picta*	LC	2
Lestes ictericus	LC	1	*Pinheyschna rileyi*	LC	3
Lestes pallidus	LC	1	*Pinheyschna subpupillata*	LC	4
Lestes plagiatus	LC	2	*Platycypha caligata*	LC	2
Lestes tridens	LC	0	*Porpax risi*	LC	3
Lestes uncifer	LC	2	*Proischnura subfurcata*	LC	2
Lestes virgatus	LC	2	*Pseudagrion acaciae*	LC	2
Lestinogomphus angustus	LC	2	*Pseudagrion coeleste*	LC	2
Mesocnemis singularis	LC	0	*Pseudagrion commoniae*	LC	3
Microgomphus nyassicus	LC	5	*Pseudagrion gamblesi*	LC	2
Nepogomphoides stuhlmanni	VU	6	*Pseudagrion glaucescens*	LC	1
Nesciothemis farinosa	LC	1	*Pseudagrion hageni*	LC	2
Neurogomphus zambeziensis	LC	3	*Pseudagrion hamoni*	LC	1
Notiothemis jonesi	LC	3	*Pseudagrion helenae*	LC	3
Notogomphus dendrohyrax	LC	3	*Pseudagrion kersteni*	LC	1
Olpogastra lugubris	LC	1	*Pseudagrion lindicum*	LC	3
Onychogomphus supinus	LC	3	*Pseudagrion makabusiense*	LC	3
Orthetrum abbotti	LC	1	*Pseudagrion massaicum*	LC	3

Mozambique: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Pseudagrion salisburyense	LC	2	*Trithemis furva*	LC	2
Pseudagrion sjoestedti	LC	1	*Trithemis hecate*	LC	1
Pseudagrion spernatum	LC	2	*Trithemis kirbyi*	LC	0
Pseudagrion sublacteum	LC	1	*Trithemis monardi*	LC	4
Pseudagrion sudanicum	LC	2	*Trithemis pluvialis*	LC	2
Rhyothemis semihyalina	LC	1	*Trithemis stictica*	LC	0
Sympetrum fonscolombii	LC	0	*Trithemis werneri*	LC	2
Tetrathemis polleni	LC	1	*Umma declivium*	VU	6
Tholymis tillarga	LC	0	*Urothemis assignata*	LC	0
Tramea basilaris	LC	0	*Urothemis edwardsii*	LC	0
Tramea limbata	LC	0	*Urothemis luciana*	LC	3
Trithemis aconita	LC	0	*Zosteraeschna usambarica*	LC	4
Trithemis annulata	LC	0	*Zygonoides fuelleborni*	LC	2
Trithemis arteriosa	LC	0	*Zygonyx natalensis*	LC	2
Trithemis donaldsoni	LC	3	*Zygonyx torridus*	LC	1
Trithemis dorsalis	LC	3			

Namibia: (124 species, 8 024 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Aciagrion heterostictum	LC	2	*Brachythemis wilsoni*	LC	2
Acisoma inflatum	LC	0	*Bradinopyga cornuta*	LC	2
Aethiothemis solitaria	LC	1	*Ceratogomphus pictus*	LC	3
Aethriamanta rezia	LC	1	*Ceriagrion corallinum*	LC	0
Africallagma glaucum	LC	3	*Ceriagrion glabrum*	LC	0
Africallagma subtile	LC	0	*Ceriagrion katamborae*	LC	4
Agriocnemis angolensis	LC	4	*Ceriagrion suave*	LC	1
Agriocnemis bumhilli	NT	5	*Chalcostephia flavifrons*	LC	1
Agriocnemis exilis	LC	1	*Crenigomphus cornutus*	LC	3
Agriocnemis gratiosa	LC	2	*Crenigomphus kavangoensis*	LC	3
Agriocnemis ruberrima	LC	4	*Crocothemis divisa*	LC	1
Agriocnemis victoria	LC	1	*Crocothemis erythraea*	LC	1
Anax bangweuluensis	NT	5	*Crocothemis sanguinolenta*	LC	1
Anax ephippiger	LC	1	*Diplacodes deminuta*	LC	3
Anax imperator	LC	1	*Diplacodes lefebvrii*	LC	1
Anax speratus	LC	2	*Diplacodes luminans*	LC	0
Anax tristis	LC	1	*Elattoneura cellularis*	LC	3
Azuragrion nigridorsum	LC	2	*Elattoneura glauca*	LC	2
Brachythemis lacustris	LC	1	*Gomphidia quarrei*	LC	2
Brachythemis leucosticta	LC	1	*Gynacantha manderica*	LC	1

Namibia: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Gynacantha villosa	LC	3	*Platycypha caligata*	LC	2
Hemistigma albipunctum	LC	0	*Pseudagrion acaciae*	LC	2
Ictinogomphus dundoensis	LC	3	*Pseudagrion assegaii*	LC	3
Ictinogomphus ferox	LC	1	*Pseudagrion coeleste*	LC	2
Ischnura senegalensis	LC	1	*Pseudagrion commoniae*	LC	3
Lestes dissimulans	LC	0	*Pseudagrion deningi*	LC	4
Lestes pallidus	LC	1	*Pseudagrion glaucescens*	LC	1
Lestes pinheyi	LC	2	*Pseudagrion hamoni*	LC	1
Lestes tridens	LC	0	*Pseudagrion kersteni*	LC	1
Lestes virgatus	LC	2	*Pseudagrion massaicum*	LC	3
Lestinogomphus angustus	LC	2	*Pseudagrion nubicum*	LC	0
Lestinogomphus silkeae	DD	4	*Pseudagrion rufostigma*	LC	3
Mesocnemis singularis	LC	0	*Pseudagrion salisburyense*	LC	2
Nesciothemis farinosa	LC	1	*Pseudagrion sjoestedti*	LC	1
Neurogomphus cocytius	LC	3	*Pseudagrion sublacteum*	LC	1
Neurogomphus zambeziensis	LC	3	*Pseudagrion sudanicum*	LC	2
Olpogastra lugubris	LC	1	*Pseudagrion vaalense*	LC	3
Orthetrum abbotti	LC	1	*Rhyothemis fenestrina*	LC	1
Orthetrum brachiale	LC	0	*Rhyothemis semihyalina*	LC	1
Orthetrum caffrum	LC	3	*Sympetrum fonscolombii*	LC	0
Orthetrum chrysostigma	LC	1	*Tholymis tillarga*	LC	0
Orthetrum icteromelas	LC	1	*Tramea basilaris*	LC	0
Orthetrum julia	LC	1	*Tramea limbata*	LC	0
Orthetrum machadoi	LC	1	*Trithemis aconita*	LC	0
Orthetrum robustum	LC	3	*Trithemis aequalis*	NT	4
Orthetrum stemmale	LC	1	*Trithemis annulata*	LC	0
Orthetrum trinacria	LC	1	*Trithemis arteriosa*	LC	0
Palpopleura deceptor	LC	0	*Trithemis donaldsoni*	LC	3
Palpopleura jucunda	LC	0	*Trithemis furva*	LC	2
Palpopleura lucia	LC	0	*Trithemis hecate*	LC	1
Palpopleura portia	LC	0	*Trithemis kirbyi*	LC	0
Pantala flavescens	LC	1	*Trithemis monardi*	LC	4
Paragomphus cataractae	NT	5	*Trithemis palustris*	LC	4
Paragomphus cognatus	LC	2	*Trithemis stictica*	LC	0
Paragomphus elpidius	LC	2	*Trithemis werneri*	LC	2
Paragomphus genei	LC	1	*Trithetrum navasi*	LC	0
Paragomphus sabicus	LC	2	*Urothemis assignata*	LC	0
Parazyxomma flavicans	LC	1	*Urothemis edwardsii*	LC	0
Phaon iridipennis	LC	0	*Zosteraeschna minuscula*	LC	4
Phyllogomphus selysi	LC	2	*Zygonoides fuelleborni*	LC	2
Phyllomacromia contumax	LC	0	*Zygonyx natalensis*	LC	2
Phyllomacromia picta	LC	2	*Zygonyx torridus*	LC	1

Niger: (30 species, 215 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Agriocnemis zerafica	LC	1	*Orthetrum icteromelas*	LC	1
Anax ephippiger	LC	1	*Orthetrum ransonnetii*	LC	1
Anax imperator	LC	1	*Orthetrum trinacria*	LC	1
Azuragrion vansomereni	LC	0	*Pantala flavescens*	LC	1
Brachythemis lacustris	LC	1	*Paragomphus sinaiticus*	NT	4
Brachythemis leucosticta	LC	1	*Pseudagrion hamoni*	LC	1
Ceriagrion glabrum	LC	0	*Pseudagrion nubicum*	LC	0
Crocothemis divisa	LC	1	*Pseudagrion sublacteum*	LC	1
Crocothemis erythraea	LC	1	*Sympetrum fonscolombii*	LC	0
Diplacodes lefebvrii	LC	1	*Tramea basilaris*	LC	0
Ischnura saharensis	LC	3	*Tramea limbata*	LC	0
Ischnura senegalensis	LC	1	*Trithemis annulata*	LC	0
Lestes pallidus	LC	1	*Trithemis arteriosa*	LC	0
Orthetrum brachiale	LC	0	*Urothemis assignata*	LC	0
Orthetrum chrysostigma	LC	1	*Urothemis edwardsii*	LC	0

Nigeria: (203 species, 1 606 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Aciagrion africanum	LC	2	*Atoconeura luxata*	LC	3
Aciagrion gracile	LC	2	*Azuragrion vansomereni*	LC	0
Acisoma inflatum	LC	0	*Brachythemis impartita*	LC	0
Acisoma trifidum	LC	0	*Brachythemis lacustris*	LC	1
Aethiothemis bequaerti	LC	3	*Brachythemis leucosticta*	LC	1
Aethiothemis incongruens	LC	5	*Brachythemis wilsoni*	LC	2
Aethiothemis solitaria	LC	1	*Bradinopyga strachani*	LC	0
Aethriamanta rezia	LC	1	*Ceriagrion bakeri*	LC	2
Africallagma subtile	LC	0	*Ceriagrion corallinum*	LC	0
Africocypha centripunctata	VU	7	*Ceriagrion glabrum*	LC	0
Agriocnemis exilis	LC	1	*Ceriagrion platystigma*	LC	2
Agriocnemis maclachlani	LC	2	*Ceriagrion rubellocerinum*	LC	4
Agriocnemis victoria	LC	1	*Ceriagrion suave*	LC	1
Agriocnemis zerafica	LC	1	*Ceriagrion tricrenaticeps*	LC	2
Allocnemis elongata	LC	4	*Chalcostephia flavifrons*	LC	1
Allocnemis flavipennis	LC	4	*Chlorocypha cancellata*	LC	4
Allocnemis nigripes	LC	4	*Chlorocypha curta*	LC	3
Anax chloromelas	LC	2	*Chlorocypha cyanifrons*	LC	4
Anax ephippiger	LC	1	*Chlorocypha dispar*	LC	5
Anax imperator	LC	1	*Chlorocypha pyriformosa*	LC	2
Anax rutherfordi	LC	4	*Chlorocypha radix*	LC	4
Anax tristis	LC	1	*Chlorocypha rubida*	LC	4

Nigeria: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Chlorocypha selysi	LC	5	*Lestes virgatus*	LC	2
Copera guttifera	LC	4	*Malgassophlebia bispina*	LC	3
Copera sikassoensis	LC	0	*Mesocnemis robusta*	LC	3
Crenigomphus renei	LC	0	*Mesocnemis singularis*	LC	0
Crocothemis divisa	LC	1	*Micromacromia camerunica*	LC	2
Crocothemis erythraea	LC	1	*Micromacromia zygoptera*	LC	4
Crocothemis sanguinolenta	LC	1	*Neodythemis afra*	LC	5
Cyanothemis simpsoni	LC	2	*Neodythemis klingi*	LC	2
Diastatomma bicolor	LC	4	*Neodythemis preussi*	LC	3
Diplacodes deminuta	LC	3	*Neophya rutherfordi*	LC	3
Diplacodes lefebvrii	LC	1	*Nesciothemis minor*	LC	2
Diplacodes luminans	LC	0	*Nesciothemis nigeriensis*	LC	2
Elattoneura acuta	LC	5	*Nesciothemis pujoli*	LC	3
Elattoneura balli	LC	4	*Neurogomphus featheri*	LC	3
Elattoneura girardi	LC	3	*Neurolestes nigeriensis*	CR	9
Elattoneura nigra	LC	1	*Notiothemis robertsi*	LC	3
Elattoneura pruinosa	LC	5	*Notogomphus spinosus*	LC	5
Elattoneura vittata	LC	4	*Nubiolestes diotima*	LC	4
Eleuthemis buettikoferi	LC	2	*Olpogastra lugubris*	LC	1
Gynacantha bullata	LC	3	*Orthetrum abbotti*	LC	1
Gynacantha cylindrata	LC	3	*Orthetrum angustiventre*	LC	2
Gynacantha manderica	LC	1	*Orthetrum austeni*	LC	2
Gynacantha nigeriensis	LC	3	*Orthetrum brachiale*	LC	0
Gynacantha sextans	LC	3	*Orthetrum camerunense*	LC	3
Gynacantha vesiculata	LC	3	*Orthetrum chrysostigma*	LC	1
Gynacantha villosa	LC	3	*Orthetrum guineense*	LC	1
Hadrothemis camarensis	LC	4	*Orthetrum hintzi*	LC	1
Hadrothemis coacta	LC	2	*Orthetrum icteromelas*	LC	1
Hadrothemis defecta	LC	1	*Orthetrum julia*	LC	1
Hadrothemis infesta	LC	2	*Orthetrum latihami*	LC	2
Hadrothemis versuta	LC	3	*Orthetrum microstigma*	LC	0
Heliaeschna fuliginosa	LC	3	*Orthetrum monardi*	LC	1
Heliaeschna sembe	LC	3	*Orthetrum stemmale*	LC	1
Hemistigma albipunctum	LC	0	*Orthetrum trinacria*	LC	1
Ictinogomphus ferox	LC	1	*Oxythemis phoenicosceles*	LC	2
Idomacromia proavita	LC	4	*Palpopleura deceptor*	LC	0
Ischnura senegalensis	LC	1	*Palpopleura jucunda*	LC	0
Lestes dissimulans	LC	0	*Palpopleura lucia*	LC	0
Lestes pallidus	LC	1	*Palpopleura portia*	LC	0
Lestes pinheyi	LC	2	*Pantala flavescens*	LC	1
Lestes plagiatus	LC	2	*Paragomphus genei*	LC	1
Lestes tridens	LC	0	*Paragomphus serrulatus*	LC	2

Nigeria: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Parazyxomma flavicans	LC	1	*Sapho ciliata*	LC	3
Phaon camerunensis	LC	2	*Sapho orichalcea*	LC	3
Phaon iridipennis	LC	0	*Sapho puella*	EN	9
Phyllogomphus moundi	LC	2	*Stenocnemis pachystigma*	LC	4
Phyllomacromia aeneothorax	LC	4	*Tetrathemis camerunensis*	LC	0
Phyllomacromia bicristulata	LC	4	*Tetrathemis godiardi*	LC	4
Phyllomacromia contumax	LC	0	*Tetrathemis polleni*	LC	1
Phyllomacromia hervei	LC	1	*Thermochoria equivocata*	LC	4
Phyllomacromia lieftincki	LC	5	*Tholymis tillarga*	LC	0
Phyllomacromia melania	LC	3	*Tramea basilaris*	LC	0
Phyllomacromia picta	LC	2	*Tramea limbata*	LC	0
Phyllomacromia sophia	LC	5	*Trithemis aconita*	LC	0
Porpax asperipes	LC	3	*Trithemis aenea*	LC	1
Porpax bipunctus	LC	4	*Trithemis annulata*	LC	0
Proischnura subfurcata	LC	2	*Trithemis arteriosa*	LC	0
Pseudagrion camerunense	LC	1	*Trithemis bredoi*	LC	2
Pseudagrion emarginatum	LC	3	*Trithemis dejouxi*	LC	3
Pseudagrion epiphonematicum	LC	3	*Trithemis dichroa*	LC	2
Pseudagrion gigas	LC	3	*Trithemis furva*	LC	2
Pseudagrion glaucescens	LC	1	*Trithemis grouti*	LC	2
Pseudagrion glaucoideum	LC	1	*Trithemis imitata*	LC	1
Pseudagrion glaucum	LC	2	*Trithemis kalula*	LC	2
Pseudagrion hamoni	LC	1	*Trithemis kirbyi*	LC	0
Pseudagrion hemicolon	LC	4	*Trithemis pruinata*	LC	1
Pseudagrion isidromorai	LC	2	*Trithemis stictica*	LC	0
Pseudagrion kersteni	LC	1	*Trithemis tropicana*	LC	3
Pseudagrion malagasoides	LC	3	*Trithetrum navasi*	LC	0
Pseudagrion melanicterum	LC	0	*Umma cincta*	LC	2
Pseudagrion nubicum	LC	0	*Umma longistigma*	LC	3
Pseudagrion risi	LC	4	*Umma mesostigma*	LC	4
Pseudagrion sjoestedti	LC	1	*Urothemis assignata*	LC	0
Pseudagrion sublacteum	LC	1	*Urothemis edwardsii*	LC	0
Pseudagrion sudanicum	LC	2	*Zygonyx flavicosta*	LC	2
Pseudagrion torridum	LC	1	*Zygonyx natalensis*	LC	2
Rhyothemis fenestrina	LC	1	*Zygonyx speciosus*	LC	3
Rhyothemis notata	LC	2	*Zygonyx torridus*	LC	1
Rhyothemis semihyalina	LC	1	*Zyxomma atlanticum*	LC	3
Sapho bicolor	LC	4			

Rwanda: (41 species, 50 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Africallagma elongatum	LC	3	*Orthetrum hintzi*	LC	1
Africallagma pseudelongatum	LC	3	*Orthetrum julia*	LC	1
Agriocnemis gratiosa	LC	2	*Palpopleura lucia*	LC	0
Anax ephippiger	LC	1	*Palpopleura portia*	LC	0
Anax imperator	LC	1	*Parazyxomma flavicans*	LC	1
Anax speratus	LC	2	*Platycypha caligata*	LC	2
Atoconeura pseudeudoxia	LC	4	*Proischnura subfurcata*	LC	2
Azuragrion nigridorsum	LC	2	*Pseudagrion hamoni*	LC	1
Ceriagrion glabrum	LC	0	*Pseudagrion kersteni*	LC	1
Crocothemis erythraea	LC	1	*Pseudagrion massaicum*	LC	3
Crocothemis sanguinolenta	LC	1	*Pseudagrion nubicum*	LC	0
Diplacodes lefebvrii	LC	1	*Pseudagrion spernatum*	LC	2
Hemistigma albipunctum	LC	0	*Rhyothemis semihyalina*	LC	1
Ictinogomphus ferox	LC	1	*Stenocypha jacksoni*	NT	6
Ischnura senegalensis	LC	1	*Tramea basilaris*	LC	0
Lestes virgatus	LC	2	*Trithemis annulata*	LC	0
Nesciothemis farinosa	LC	1	*Trithemis arteriosa*	LC	0
Orthetrum abbotti	LC	1	*Trithemis donaldsoni*	LC	3
Orthetrum brachiale	LC	0	*Trithemis stictica*	LC	0
Orthetrum caffrum	LC	3	*Zygonyx natalensis*	LC	2
Orthetrum chrysostigma	LC	1			

Senegal: (66 species, 671 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Acisoma inflatum	LC	0	*Ceriagrion corallinum*	LC	0
Aethiothemis solitaria	LC	1	*Ceriagrion glabrum*	LC	0
Aethriamanta rezia	LC	1	*Ceriagrion suave*	LC	1
Africallagma subtile	LC	0	*Chalcostephia flavifrons*	LC	1
Agriocnemis exilis	LC	1	*Chlorocypha dispar*	LC	5
Agriocnemis maclachlani	LC	2	*Crocothemis divisa*	LC	1
Agriocnemis victoria	LC	1	*Crocothemis erythraea*	LC	1
Agriocnemis zerafica	LC	1	*Diplacodes lefebvrii*	LC	1
Anax ephippiger	LC	1	*Hadrothemis defecta*	LC	1
Anax imperator	LC	1	*Hemistigma albipunctum*	LC	0
Azuragrion vansomereni	LC	0	*Ischnura senegalensis*	LC	1
Brachythemis impartita	LC	0	*Lestes dissimulans*	LC	0
Brachythemis lacustris	LC	1	*Lestes ictericus*	LC	1
Brachythemis leucosticta	LC	1	*Lestes pallidus*	LC	1
Bradinopyga strachani	LC	0	*Orthetrum abbotti*	LC	1

Senegal: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Orthetrum angustiventre	LC	2	*Pseudagrion sublacteum*	LC	1
Orthetrum brachiale	LC	0	*Pseudagrion torridum*	LC	1
Orthetrum chrysostigma	LC	1	*Rhyothemis fenestrina*	LC	1
Orthetrum guineense	LC	1	*Rhyothemis semihyalina*	LC	1
Orthetrum hintzi	LC	1	*Sapho fumosa*	LC	4
Orthetrum stemmale	LC	1	*Tholymis tillarga*	LC	0
Orthetrum trinacria	LC	1	*Tramea basilaris*	LC	0
Palpopleura deceptor	LC	0	*Tramea limbata*	LC	0
Palpopleura lucia	LC	0	*Trithemis annulata*	LC	0
Palpopleura portia	LC	0	*Trithemis arteriosa*	LC	0
Pantala flavescens	LC	1	*Trithemis bifida*	LC	0
Parazyxomma flavicans	LC	1	*Trithemis grouti*	LC	2
Phaon iridipennis	LC	0	*Trithemis hecate*	LC	1
Phyllomacromia contumax	LC	0	*Trithemis kirbyi*	LC	0
Pseudagrion glaucescens	LC	1	*Trithemis pruinata*	LC	1
Pseudagrion hamoni	LC	1	*Urothemis assignata*	LC	0
Pseudagrion melanicterum	LC	0	*Urothemis edwardsii*	LC	0
Pseudagrion nubicum	LC	0	*Zyxomma atlanticum*	LC	3

Sierra Leone: (155 species, 1 332 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Acisoma inflatum	LC	0	*Bradinopyga strachani*	LC	0
Acisoma trifidum	LC	0	*Ceriagrion bakeri*	LC	2
Aethiothemis bella	LC	2	*Ceriagrion corallinum*	LC	0
Aethiothemis incongruens	LC	5	*Ceriagrion glabrum*	LC	0
Aethiothemis solitaria	LC	1	*Ceriagrion rubellocerinum*	LC	4
Aethriamanta rezia	LC	1	*Ceriagrion suave*	LC	1
Africallagma subtile	LC	0	*Ceriagrion whellani*	LC	2
Agriocnemis angustirami	LC	4	*Chalcostephia flavifrons*	LC	1
Agriocnemis exilis	LC	1	*Chlorocypha curta*	LC	3
Agriocnemis maclachlani	LC	2	*Chlorocypha dispar*	LC	5
Agriocnemis victoria	LC	1	*Chlorocypha luminosa*	LC	4
Allocnemis elongata	LC	4	*Chlorocypha pyriformosa*	LC	2
Allocnemis flavipennis	LC	4	*Chlorocypha radix*	LC	4
Allocnemis subnodalis	LC	5	*Chlorocypha rubida*	LC	4
Anax chloromelas	LC	2	*Chlorocypha selysi*	LC	5
Atoconeura luxata	LC	3	*Copera guttifera*	LC	4
Azuragrion vansomereni	LC	0	*Copera sikassoensis*	LC	0
Brachythemis lacustris	LC	1	*Crocothemis divisa*	LC	1

Sierra Leone: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Crocothemis erythraea	LC	1	*Olpogastra lugubris*	LC	1
Crocothemis sanguinolenta	LC	1	*Orthetrum abbotti*	LC	1
Cyanothemis simpsoni	LC	2	*Orthetrum africanum*	LC	2
Diastatomma gamblesi	LC	4	*Orthetrum angustiventre*	LC	2
Diplacodes lefebvrii	LC	1	*Orthetrum austeni*	LC	2
Diplacodes luminans	LC	0	*Orthetrum brachiale*	LC	0
Elattoneura balli	LC	4	*Orthetrum chrysostigma*	LC	1
Elattoneura girardi	LC	3	*Orthetrum guineense*	LC	1
Elattoneura nigra	LC	1	*Orthetrum hintzi*	LC	1
Elattoneura villiersi	LC	4	*Orthetrum icteromelas*	LC	1
Eleuthemis buettikoferi	LC	2	*Orthetrum julia*	LC	1
Gomphidia gamblesi	LC	3	*Orthetrum latihami*	LC	2
Gynacantha africana	LC	3	*Orthetrum microstigma*	LC	0
Gynacantha bullata	LC	3	*Orthetrum monardi*	LC	1
Gynacantha cylindrata	LC	3	*Orthetrum stemmale*	LC	1
Gynacantha manderica	LC	1	*Oxythemis phoenicosceles*	LC	2
Gynacantha nigeriensis	LC	3	*Palpopleura deceptor*	LC	0
Gynacantha sextans	LC	3	*Palpopleura jucunda*	LC	0
Gynacantha vesiculata	LC	3	*Palpopleura lucia*	LC	0
Gynacantha victoriae	LC	3	*Palpopleura portia*	LC	0
Hadrothemis camarensis	LC	4	*Pantala flavescens*	LC	1
Hadrothemis defecta	LC	1	*Paragomphus genei*	LC	1
Hadrothemis infesta	LC	2	*Paragomphus kiautai*	LC	3
Hadrothemis versuta	LC	3	*Paragomphus serrulatus*	LC	2
Heliaeschna fuliginosa	LC	3	*Paragomphus tournieri*	LC	5
Hemistigma albipunctum	LC	0	*Phaon camerunensis*	LC	2
Ictinogomphus ferox	LC	1	*Phaon iridipennis*	LC	0
Ictinogomphus fraseri	LC	2	*Phyllomacromia aeneothorax*	LC	4
Ischnura senegalensis	LC	1	*Phyllomacromia hervei*	LC	1
Lestinogomphus matilei	LC	5	*Phyllomacromia sophia*	LC	5
Libyogomphus christinae	LC	5	*Porpax bipunctus*	LC	4
Malgassophlebia bispina	LC	3	*Pseudagrion camerunense*	LC	1
Mesocnemis singularis	LC	0	*Pseudagrion cyathiforme*	LC	4
Micromacromia camerunica	LC	2	*Pseudagrion epiphonematicum*	LC	3
Micromacromia zygoptera	LC	4	*Pseudagrion gigas*	LC	3
Neodythemis campioni	LC	4	*Pseudagrion glaucescens*	LC	1
Neodythemis klingi	LC	2	*Pseudagrion glaucum*	LC	2
Neophya rutherfordi	LC	3	*Pseudagrion hamoni*	LC	1
Nesciothemis minor	LC	2	*Pseudagrion hemicolon*	LC	4
Nesciothemis nigeriensis	LC	2	*Pseudagrion isidromorai*	LC	2
Nesciothemis pujoli	LC	3	*Pseudagrion kersteni*	LC	1
Notiothemis robertsi	LC	3	*Pseudagrion malagasoides*	LC	3

Sierra Leone: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Pseudagrion melanicterum	LC	0	*Trithemis arteriosa*	LC	0
Pseudagrion sjoestedti	LC	1	*Trithemis basitincta*	LC	3
Pseudagrion sublacteum	LC	1	*Trithemis bredoi*	LC	2
Rhyothemis fenestrina	LC	1	*Trithemis dichroa*	LC	2
Rhyothemis notata	LC	2	*Trithemis grouti*	LC	2
Rhyothemis semihyalina	LC	1	*Trithemis hecate*	LC	1
Sapho bicolor	LC	4	*Trithemis imitata*	LC	1
Sapho ciliata	LC	3	*Trithemis kalula*	LC	2
Sapho fumosa	LC	4	*Trithemis stictica*	LC	0
Tetrathemis camerunensis	LC	0	*Trithetrum navasi*	LC	0
Tetrathemis godiardi	LC	4	*Umma cincta*	LC	2
Thermochoria equivocata	LC	4	*Urothemis assignata*	LC	0
Tholymis tillarga	LC	0	*Urothemis edwardsii*	LC	0
Tramea basilaris	LC	0	*Zygonyx chrysobaphes*	LC	2
Tramea limbata	LC	0	*Zygonyx flavicosta*	LC	2
Trithemis aconita	LC	0	*Zygonyx torridus*	LC	1
Trithemis africana	LC	4	*Zyxomma atlanticum*	LC	3
Trithemis annulata	LC	0			

Somalia: (55 species, 371 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Agriocnemis exilis	LC	1	*Lestes uncifer*	LC	2
Anax ephippiger	LC	1	*Macrodiplax cora*	LC	3
Anax imperator	LC	1	*Nesciothemis farinosa*	LC	1
Anax parthenope	LC	1	*Olpogastra lugubris*	LC	1
Anax speratus	LC	2	*Orthetrum abbotti*	LC	1
Brachythemis impartita	LC	0	*Orthetrum brachiale*	LC	0
Brachythemis lacustris	LC	1	*Orthetrum chrysostigma*	LC	1
Brachythemis leucosticta	LC	1	*Orthetrum guineense*	LC	1
Ceriagrion glabrum	LC	0	*Orthetrum julia*	LC	1
Ceriagrion suave	LC	1	*Orthetrum sabina*	LC	1
Crocothemis erythraea	LC	1	*Orthetrum stemmale*	LC	1
Crocothemis sanguinolenta	LC	1	*Orthetrum trinacria*	LC	1
Diplacodes lefebvrii	LC	1	*Palpopleura deceptor*	LC	0
Diplacodes luminans	LC	0	*Palpopleura lucia*	LC	0
Gynacantha manderica	LC	1	*Pantala flavescens*	LC	1
Hemistigma albipunctum	LC	0	*Paragomphus genei*	LC	1
Ictinogomphus ferox	LC	1	*Phaon iridipennis*	LC	0
Ischnura senegalensis	LC	1	*Phyllomacromia contumax*	LC	0
Lestes pallidus	LC	1	*Pseudagrion kersteni*	LC	1
Lestes tridens	LC	0	*Pseudagrion lindicum*	LC	3

Somalia: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Pseudagrion massaicum	LC	3	*Tramea limbata*	LC	0
Pseudagrion niloticum	LC	3	*Trithemis annulata*	LC	0
Pseudagrion sublacteum	LC	1	*Trithemis arteriosa*	LC	0
Rhyothemis semihyalina	LC	1	*Trithemis furva*	LC	2
Sympetrum fonscolombii	LC	0	*Trithemis kirbyi*	LC	0
Tetrathemis polleni	LC	1	*Trithemis stictica*	LC	0
Tholymis tillarga	LC	0	*Urothemis assignata*	LC	0
Tramea basilaris	LC	0			

South Sudan: (58 species, 167 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Aethriamanta rezia	LC	1	*Mesocnemis singularis*	LC	0
Africallagma subtile	LC	0	*Micromacromia camerunica*	LC	2
Agriocnemis exilis	LC	1	*Orthetrum angustiventre*	LC	2
Agriocnemis forcipata	LC	3	*Orthetrum brachiale*	LC	0
Agriocnemis gratiosa	LC	2	*Orthetrum chrysostigma*	LC	1
Agriocnemis inversa	LC	4	*Orthetrum icteromelas*	LC	1
Agriocnemis zerafica	LC	1	*Orthetrum julia*	LC	1
Anax ephippiger	LC	1	*Orthetrum microstigma*	LC	0
Atoconeura kenya	LC	3	*Orthetrum trinacria*	LC	1
Brachythemis lacustris	LC	1	*Pantala flavescens*	LC	1
Brachythemis leucosticta	LC	1	*Phaon iridipennis*	LC	0
Brachythemis wilsoni	LC	2	*Platycypha caligata*	LC	2
Bradinopyga strachani	LC	0	*Pseudagrion glaucescens*	LC	1
Ceriagrion corallinum	LC	0	*Pseudagrion hamoni*	LC	1
Ceriagrion glabrum	LC	0	*Pseudagrion niloticum*	LC	3
Ceriagrion kordofanicum	LC	4	*Pseudagrion nubicum*	LC	0
Ceriagrion suave	LC	1	*Pseudagrion sjoestedti*	LC	1
Chalcostephia flavifrons	LC	1	*Pseudagrion sudanicum*	LC	2
Chlorocypha trifaria	LC	5	*Pseudagrion torridum*	LC	1
Crocothemis divisa	LC	1	*Rhyothemis semihyalina*	LC	1
Crocothemis erythraea	LC	1	*Tholymis tillarga*	LC	0
Diplacodes deminuta	LC	3	*Trithemis annulata*	LC	0
Diplacodes lefebvrii	LC	1	*Trithemis arteriosa*	LC	0
Hemistigma albipunctum	LC	0	*Trithemis hecate*	LC	1
Ictinogomphus ferox	LC	1	*Trithemis imitata*	LC	1
Ischnura senegalensis	LC	1	*Trithemis werneri*	LC	2
Lestes ictericus	LC	1	*Trithetrum navasi*	LC	0
Lestes ochraceus	LC	1	*Urothemis assignata*	LC	0
Mesocnemis robusta	LC	3	*Urothemis edwardsii*	LC	0

Sudan: (55 species, 558 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Aethiothemis solitaria	LC	1	*Palpopleura deceptor*	LC	0
Anax ephippiger	LC	1	*Palpopleura jucunda*	LC	0
Anax imperator	LC	1	*Palpopleura lucia*	LC	0
Anax parthenope	LC	1	*Pantala flavescens*	LC	1
Anax speratus	LC	2	*Paragomphus genei*	LC	1
Brachythemis leucosticta	LC	1	*Paragomphus pumilio*	LC	2
Bradinopyga strachani	LC	0	*Paragomphus sinaiticus*	NT	4
Chlorocypha curta	LC	3	*Proischnura subfurcata*	LC	2
Crocothemis divisa	LC	1	*Pseudagrion hamoni*	LC	1
Crocothemis erythraea	LC	1	*Pseudagrion kersteni*	LC	1
Crocothemis sanguinolenta	LC	1	*Pseudagrion massaicum*	LC	3
Diplacodes lefebvrii	LC	1	*Pseudagrion melanicterum*	LC	0
Ictinogomphus ferox	LC	1	*Pseudagrion niloticum*	LC	3
Ischnura evansi	LC	4	*Pseudagrion nubicum*	LC	0
Ischnura senegalensis	LC	1	*Pseudagrion sjoestedti*	LC	1
Lestes ictericus	LC	1	*Pseudagrion sublacteum*	LC	1
Lestes pallidus	LC	1	*Pseudagrion sudanicum*	LC	2
Mesocnemis robusta	LC	3	*Pseudagrion torridum*	LC	1
Mesocnemis singularis	LC	0	*Sympetrum fonscolombii*	LC	0
Nesciothemis farinosa	LC	1	*Trithemis annulata*	LC	0
Olpogastra lugubris	LC	1	*Trithemis arteriosa*	LC	0
Orthetrum abbotti	LC	1	*Trithemis dichroa*	LC	2
Orthetrum brachiale	LC	0	*Trithemis furva*	LC	2
Orthetrum caffrum	LC	3	*Trithemis kirbyi*	LC	0
Orthetrum chrysostigma	LC	1	*Trithemis stictica*	LC	0
Orthetrum julia	LC	1	*Urothemis edwardsii*	LC	0
Orthetrum ransonnetii	LC	1	*Zygonyx torridus*	LC	1
Orthetrum sabina	LC	1			

Swaziland: (52 species, 237 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Africallagma glaucum	LC	3	*Chlorolestes fasciatus*	LC	4
Allocnemis leucosticta	LC	5	*Crocothemis erythraea*	LC	1
Anax ephippiger	LC	1	*Crocothemis sanguinolenta*	LC	1
Anax imperator	LC	1	*Diplacodes lefebvrii*	LC	1
Azuragrion nigridorsum	LC	2	*Elattoneura glauca*	LC	2
Brachythemis leucosticta	LC	1	*Ictinogomphus ferox*	LC	1
Bradinopyga cornuta	LC	2	*Ischnura senegalensis*	LC	1
Ceriagrion glabrum	LC	0	*Lestes plagiatus*	LC	2

Swaziland: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Lestes virgatus	LC	2	*Pseudagrion acaciae*	LC	2
Mesocnemis singularis	LC	0	*Pseudagrion caffrum*	LC	4
Nesciothemis farinosa	LC	1	*Pseudagrion commoniae*	LC	3
Onychogomphus supinus	LC	3	*Pseudagrion hageni*	LC	2
Orthetrum abbotti	LC	1	*Pseudagrion hamoni*	LC	1
Orthetrum caffrum	LC	3	*Pseudagrion kersteni*	LC	1
Orthetrum chrysostigma	LC	1	*Pseudagrion massaicum*	LC	3
Orthetrum hintzi	LC	1	*Pseudagrion salisburyense*	LC	2
Orthetrum julia	LC	1	*Pseudagrion spernatum*	LC	2
Orthetrum trinacria	LC	1	*Pseudagrion sublacteum*	LC	1
Palpopleura jucunda	LC	0	*Tramea basilaris*	LC	0
Palpopleura lucia	LC	0	*Trithemis annulata*	LC	0
Palpopleura portia	LC	0	*Trithemis arteriosa*	LC	0
Pantala flavescens	LC	1	*Trithemis dorsalis*	LC	3
Paragomphus sabicus	LC	2	*Trithemis furva*	LC	2
Phaon iridipennis	LC	0	*Trithemis kirbyi*	LC	0
Phyllomacromia picta	LC	2	*Trithemis pluvialis*	LC	2
Platycypha caligata	LC	2	*Trithemis stictica*	LC	0

Tanzania: (174 species, 1 948 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Aciagrion dondoense	LC	3	*Anaciaeschna triangulifera*	LC	1
Aciagrion gracile	LC	2	*Anax ephippiger*	LC	1
Acisoma inflatum	LC	0	*Anax imperator*	LC	1
Aethiothemis solitaria	LC	1	*Anax speratus*	LC	2
Aethriamanta rezia	LC	1	*Anax tristis*	LC	1
Africallagma elongatum	LC	3	*Atoconeura biordinata*	LC	3
Africallagma glaucum	LC	3	*Atoconeura kenya*	LC	3
Africallagma sinuatum	LC	4	*Azuragrion nigridorsum*	LC	2
Africallagma subtile	LC	0	*Brachythemis lacustris*	LC	1
Africallagma vaginale	LC	2	*Brachythemis leucosticta*	LC	1
Afroaeschna scotias	LC	5	*Bradinopyga cornuta*	LC	2
Agriocnemis exilis	LC	1	*Ceriagrion corallinum*	LC	0
Agriocnemis gratiosa	LC	2	*Ceriagrion glabrum*	LC	0
Agriocnemis pinheyi	LC	3	*Ceriagrion kordofanicum*	LC	4
Agriocnemis victoria	LC	1	*Ceriagrion suave*	LC	1
Allocnemis abbotti	NT	5	*Chalcostephia flavifrons*	LC	1
Allocnemis superba	LC	4	*Chlorocypha consueta*	LC	2
Amanipodagrion gilliesi	CR	9	*Coryphagrion grandis*	VU	7

Tanzania: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Crenigomphus hartmanni	LC	2	*Notogomphus dendrohyrax*	LC	3
Crenigomphus renei	LC	0	*Notogomphus dorsalis*	LC	2
Crocothemis divisa	LC	1	*Notogomphus kilimandjaricus*	LC	4
Crocothemis erythraea	LC	1	*Notogomphus zernyi*	LC	3
Crocothemis sanguinolenta	LC	1	*Olpogastra lugubris*	LC	1
Diplacodes deminuta	LC	3	*Onychogomphus styx*	LC	2
Diplacodes lefebvrii	LC	1	*Orthetrum abbotti*	LC	1
Diplacodes luminans	LC	0	*Orthetrum austeni*	LC	2
Diplacodes pumila	LC	3	*Orthetrum brachiale*	LC	0
Elattoneura cellularis	LC	3	*Orthetrum caffrum*	LC	3
Elattoneura glauca	LC	2	*Orthetrum chrysostigma*	LC	1
Eleuthemis quadrigutta	LC	4	*Orthetrum guineense*	LC	1
Gomphidia quarrei	LC	2	*Orthetrum hintzi*	LC	1
Gynacantha bullata	LC	3	*Orthetrum icteromelas*	LC	1
Gynacantha immaculifrons	LC	4	*Orthetrum julia*	LC	1
Gynacantha manderica	LC	1	*Orthetrum machadoi*	LC	1
Gynacantha usambarica	LC	3	*Orthetrum monardi*	LC	1
Gynacantha vesiculata	LC	3	*Orthetrum stemmale*	LC	1
Gynacantha villosa	LC	3	*Orthetrum trinacria*	LC	1
Hadrothemis scabrifrons	LC	4	*Palpopleura deceptor*	LC	0
Hemicordulia africana	LC	3	*Palpopleura jucunda*	LC	0
Hemistigma albipunctum	LC	0	*Palpopleura lucia*	LC	0
Ictinogomphus ferox	LC	1	*Palpopleura portia*	LC	0
Ictinogomphus regisalberti	LC	2	*Pantala flavescens*	LC	1
Ischnura senegalensis	LC	1	*Paragomphus alluaudi*	LC	3
Lestes amicus	LC	3	*Paragomphus cognatus*	LC	2
Lestes dissimulans	LC	0	*Paragomphus elpidius*	LC	2
Lestes pallidus	LC	1	*Paragomphus genei*	LC	1
Lestes pinheyi	LC	2	*Paragomphus magnus*	LC	3
Lestes plagiatus	LC	2	*Paragomphus sabicus*	LC	2
Lestes tridens	LC	0	*Phaon iridipennis*	LC	0
Lestes uncifer	LC	2	*Phyllogomphus selysi*	LC	2
Lestes virgatus	LC	2	*Phyllomacromia contumax*	LC	0
Lestinogomphus angustus	LC	2	*Phyllomacromia melania*	LC	3
Mesocnemis singularis	LC	0	*Phyllomacromia monoceros*	LC	4
Microgomphus nyassicus	LC	5	*Phyllomacromia picta*	LC	2
Nepogomphoides stuhlmanni	VU	6	*Phyllomacromia sylvatica*	LC	5
Nesciothemis farinosa	LC	1	*Pinheyschna meruensis*	LC	4
Neurogomphus zambeziensis	LC	3	*Pinheyschna rileyi*	LC	3
Notiothemis jonesi	LC	3	*Platycypha auripes*	EN	9
Notiothemis robertsi	LC	3	*Platycypha caligata*	LC	2

Tanzania: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Platycypha lacustris	LC	3	*Tramea basilaris*	LC	0
Platycypha pinheyi	NT	6	*Tramea limbata*	LC	0
Proischnura subfurcata	LC	2	*Trithemis aconita*	LC	0
Pseudagrion acaciae	LC	2	*Trithemis annulata*	LC	0
Pseudagrion bicoerulans	VU	6	*Trithemis arteriosa*	LC	0
Pseudagrion coeleste	LC	2	*Trithemis bifida*	LC	0
Pseudagrion commoniae	LC	3	*Trithemis dichroa*	LC	2
Pseudagrion gamblesi	LC	2	*Trithemis donaldsoni*	LC	3
Pseudagrion glaucescens	LC	1	*Trithemis dorsalis*	LC	3
Pseudagrion hageni	LC	2	*Trithemis furva*	LC	2
Pseudagrion hamoni	LC	1	*Trithemis grouti*	LC	2
Pseudagrion kersteni	LC	1	*Trithemis hecate*	LC	1
Pseudagrion lindicum	LC	3	*Trithemis integra*	LC	5
Pseudagrion massaicum	LC	3	*Trithemis kirbyi*	LC	0
Pseudagrion melanicterum	LC	0	*Trithemis nuptialis*	LC	2
Pseudagrion nubicum	LC	0	*Trithemis pluvialis*	LC	2
Pseudagrion rufocinctum	LC	5	*Trithemis pruinata*	LC	1
Pseudagrion salisburyense	LC	2	*Trithemis stictica*	LC	0
Pseudagrion sjoestedti	LC	1	*Trithemis werneri*	LC	2
Pseudagrion spernatum	LC	2	*Umma declivium*	VU	6
Pseudagrion sublacteum	LC	1	*Urothemis assignata*	LC	0
Pseudagrion sudanicum	LC	2	*Urothemis edwardsii*	LC	0
Rhyothemis fenestrina	LC	1	*Zosteraeschna ellioti*	LC	3
Rhyothemis semihyalina	LC	1	*Zosteraeschna usambarica*	LC	4
Teinobasis alluaudi	LC	4	*Zygonoides fuelleborni*	LC	2
Tetrathemis polleni	LC	1	*Zygonyx natalensis*	LC	2
Thermochoria jeanneli	LC	4	*Zygonyx regisalberti*	LC	3
Tholymis tillarga	LC	0	*Zygonyx torridus*	LC	1

Togo: (91 species, 477 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Acisoma trifidum	LC	0	*Anax imperator*	LC	1
Aethiothemis solitaria	LC	1	*Anax tristis*	LC	1
Aethriamanta rezia	LC	1	*Azuragrion vansomereni*	LC	0
Agriocnemis exilis	LC	1	*Brachythemis lacustris*	LC	1
Agriocnemis zerafica	LC	1	*Brachythemis leucosticta*	LC	1
Allocnemis elongata	LC	4	*Brachythemis wilsoni*	LC	2
Allocnemis flavipennis	LC	4	*Bradinopyga strachani*	LC	0
Anax ephippiger	LC	1	*Ceriagrion bakeri*	LC	2

Togo: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Ceriagrion glabrum	LC	0	*Orthetrum julia*	LC	1
Ceriagrion suave	LC	1	*Orthetrum trinacria*	LC	1
Chalcostephia flavifrons	LC	1	*Palpopleura deceptor*	LC	0
Chlorocypha curta	LC	3	*Palpopleura lucia*	LC	0
Chlorocypha dispar	LC	5	*Palpopleura portia*	LC	0
Chlorocypha luminosa	LC	4	*Pantala flavescens*	LC	1
Chlorocypha radix	LC	4	*Paragomphus genei*	LC	1
Chlorocypha selysi	LC	5	*Paragomphus serrulatus*	LC	2
Copera guttifera	LC	4	*Phaon iridipennis*	LC	0
Copera sikassoensis	LC	0	*Phyllomacromia contumax*	LC	0
Crocothemis divisa	LC	1	*Phyllomacromia melania*	LC	3
Crocothemis erythraea	LC	1	*Phyllomacromia sophia*	LC	5
Crocothemis sanguinolenta	LC	1	*Pseudagrion gigas*	LC	3
Diastatomma bicolor	LC	4	*Pseudagrion glaucescens*	LC	1
Diastatomma gamblesi	LC	4	*Pseudagrion hamoni*	LC	1
Diplacodes lefebvrii	LC	1	*Pseudagrion kersteni*	LC	1
Diplacodes luminans	LC	0	*Pseudagrion melanicterum*	LC	0
Elattoneura balli	LC	4	*Pseudagrion nubicum*	LC	0
Elattoneura nigra	LC	1	*Pseudagrion sjoestedti*	LC	1
Gomphidia gamblesi	LC	3	*Pseudagrion sublacteum*	LC	1
Gynacantha bullata	LC	3	*Rhyothemis semihyalina*	LC	1
Hemistigma albipunctum	LC	0	*Sapho bicolor*	LC	4
Ictinogomphus ferox	LC	1	*Sapho ciliata*	LC	3
Ischnura senegalensis	LC	1	*Tetrathemis camerunensis*	LC	0
Lestes dissimulans	LC	0	*Tholymis tillarga*	LC	0
Lestes tridens	LC	0	*Tramea basilaris*	LC	0
Lestinogomphus matilei	LC	5	*Trithemis aconita*	LC	0
Mesocnemis singularis	LC	0	*Trithemis annulata*	LC	0
Neodythemis klingi	LC	2	*Trithemis arteriosa*	LC	0
Nesciothemis pujoli	LC	3	*Trithemis dichroa*	LC	2
Olpogastra lugubris	LC	1	*Trithemis kirbyi*	LC	0
Orthetrum abbotti	LC	1	*Trithemis pruinata*	LC	1
Orthetrum angustiventre	LC	2	*Umma cincta*	LC	2
Orthetrum austeni	LC	2	*Urothemis assignata*	LC	0
Orthetrum brachiale	LC	0	*Zygonyx chrysobaphes*	LC	2
Orthetrum chrysostigma	LC	1	*Zygonyx flavicosta*	LC	2
Orthetrum guineense	LC	1	*Zygonyx torridus*	LC	1
Orthetrum icteromelas	LC	1			

Tunisia: (54 species, 2 444 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Aeshna affinis	LC	4	*Lestes virens*	LC	2
Aeshna isoceles	LC	4	*Lindenia tetraphylla*	LC	5
Aeshna mixta	LC	2	*Onychogomphus costae*	NT	4
Anax ephippiger	LC	1	*Onychogomphus forcipatus*	LC	3
Anax imperator	LC	1	*Onychogomphus uncatus*	LC	3
Anax parthenope	LC	1	*Orthetrum brunneum*	LC	4
Boyeria irene	LC	3	*Orthetrum cancellatum*	LC	4
Brachythemis impartita	LC	0	*Orthetrum chrysostigma*	LC	1
Calopteryx exul	CR	7	*Orthetrum coerulescens*	LC	3
Calopteryx haemorrhoidalis	LC	3	*Orthetrum nitidinerve*	LC	4
Ceriagrion tenellum	LC	4	*Orthetrum ransonnetii*	LC	1
Chalcolestes viridis	LC	3	*Orthetrum sabina*	LC	1
Coenagrion caerulescens	LC	4	*Orthetrum trinacria*	LC	1
Coenagrion mercuriale	NT	5	*Pantala flavescens*	LC	1
Coenagrion puella	LC	4	*Paragomphus genei*	LC	1
Coenagrion scitulum	LC	4	*Platycnemis subdilatata*	LC	3
Crocothemis erythraea	LC	1	*Selysiothemis nigra*	LC	2
Diplacodes lefebvrii	LC	1	*Sympecma fusca*	LC	2
Enallagma deserti	LC	4	*Sympetrum fonscolombii*	LC	0
Erythromma lindenii	LC	4	*Sympetrum meridionale*	LC	4
Erythromma viridulum	LC	4	*Sympetrum sanguineum*	LC	3
Gomphus lucasii	VU	6	*Sympetrum sinaiticum*	LC	2
Ischnura fountaineae	LC	3	*Sympetrum striolatum*	LC	3
Ischnura graellsii	LC	4	*Trithemis annulata*	LC	0
Ischnura pumilio	LC	4	*Trithemis arteriosa*	LC	0
Ischnura saharensis	LC	3	*Trithemis kirbyi*	LC	0
Lestes barbarus	LC	4	*Zygonyx torridus*	LC	1

Uganda: (213 species, 4 599 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Aciagrion africanum	LC	2	*Africallagma pseudelongatum*	LC	3
Aciagrion gracile	LC	2	*Africallagma subtile*	LC	0
Acisoma inflatum	LC	0	*Africallagma vaginale*	LC	2
Acisoma trifidum	LC	0	*Afroaeschna scotias*	LC	5
Acisoma variegatum	LC	3	*Agriocnemis exilis*	LC	1
Aethiothemis solitaria	LC	1	*Agriocnemis forcipata*	LC	3
Aethriamanta rezia	LC	1	*Agriocnemis gratiosa*	LC	2
Africallagma elongatum	LC	3	*Agriocnemis inversa*	LC	4
Africallagma glaucum	LC	3	*Agriocnemis maclachlani*	LC	2

Uganda: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Agriocnemis palaeforma	EN	8	*Crocothemis erythraea*	LC	1
Agriocnemis victoria	LC	1	*Crocothemis sanguinolenta*	LC	1
Agriocnemis zerafica	LC	1	*Diastatomma selysi*	LC	4
Allocnemis nigripes	LC	4	*Diplacodes deminuta*	LC	3
Allocnemis pauli	LC	4	*Diplacodes lefebvrii*	LC	1
Allocnemis superba	LC	4	*Diplacodes luminans*	LC	0
Anaciaeschna triangulifera	LC	1	*Elattoneura glauca*	LC	2
Anax chloromelas	LC	2	*Elattoneura lliba*	LC	4
Anax ephippiger	LC	1	*Elattoneura nigra*	LC	1
Anax imperator	LC	1	*Gomphidia bredoi*	LC	2
Anax speratus	LC	2	*Gynacantha africana*	LC	3
Anax tristis	LC	1	*Gynacantha bullata*	LC	3
Atoconeura eudoxia	LC	4	*Gynacantha cylindrata*	LC	3
Atoconeura kenya	LC	3	*Gynacantha manderica*	LC	1
Atoconeura pseudeudoxia	LC	4	*Gynacantha nigeriensis*	LC	3
Azuragrion nigridorsum	LC	2	*Gynacantha sextans*	LC	3
Azuragrion vansomereni	LC	0	*Gynacantha vesiculata*	LC	3
Brachythemis impartita	LC	0	*Gynacantha victoriae*	LC	3
Brachythemis lacustris	LC	1	*Gynacantha villosa*	LC	3
Brachythemis leucosticta	LC	1	*Hadrothemis camarensis*	LC	4
Brachythemis wilsoni	LC	2	*Hadrothemis coacta*	LC	2
Bradinopyga cornuta	LC	2	*Hadrothemis defecta*	LC	1
Bradinopyga strachani	LC	0	*Hadrothemis infesta*	LC	2
Ceriagrion bakeri	LC	2	*Heliaeschna cynthiae*	LC	4
Ceriagrion corallinum	LC	0	*Heliaeschna fuliginosa*	LC	3
Ceriagrion glabrum	LC	0	*Heliaeschna ugandica*	LC	4
Ceriagrion kordofanicum	LC	4	*Hemicordulia africana*	LC	3
Ceriagrion platystigma	LC	2	*Hemistigma albipunctum*	LC	0
Ceriagrion suave	LC	1	*Ictinogomphus ferox*	LC	1
Ceriagrion varians	LC	4	*Ictinogomphus regisalberti*	LC	2
Ceriagrion whellani	LC	2	*Ischnura senegalensis*	LC	1
Chalcostephia flavifrons	LC	1	*Lestes dissimulans*	LC	0
Chlorocypha cancellata	LC	4	*Lestes ictericus*	LC	1
Chlorocypha curta	LC	3	*Lestes ochraceus*	LC	1
Chlorocypha trifaria	LC	5	*Lestes pallidus*	LC	1
Chlorocypha victoriae	LC	3	*Lestes pinheyi*	LC	2
Copera nyansana	LC	4	*Lestes plagiatus*	LC	2
Copera sikassoensis	LC	0	*Lestes uncifer*	LC	2
Crenigomphus hartmanni	LC	2	*Lestes virgatus*	LC	2
Crenigomphus renei	LC	0	*Lestinogomphus angustus*	LC	2
Crocothemis divisa	LC	1	*Malgassophlebia bispina*	LC	3

Uganda: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Mesocnemis singularis	LC	0	*Phyllogomphus annulus*	LC	3
Micromacromia camerunica	LC	2	*Phyllogomphus selysi*	LC	2
Neodythemis afra	LC	5	*Phyllomacromia aureozona*	LC	4
Neodythemis munyaga	CR	8	*Phyllomacromia contumax*	LC	0
Neodythemis preussi	LC	3	*Phyllomacromia funicularioides*	NT	6
Nesciothemis farinosa	LC	1	*Phyllomacromia melania*	LC	3
Notiothemis jonesi	LC	3	*Phyllomacromia picta*	LC	2
Notiothemis robertsi	LC	3	*Phyllomacromia sylvatica*	LC	5
Notogomphus dorsalis	LC	2	*Pinheyschna meruensis*	LC	4
Notogomphus leroyi	LC	4	*Pinheyschna rileyi*	LC	3
Notogomphus lujai	LC	4	*Platycypha caligata*	LC	2
Olpogastra lugubris	LC	1	*Platycypha lacustris*	LC	3
Onychogomphus styx	LC	2	*Proischnura subfurcata*	LC	2
Orthetrum abbotti	LC	1	*Pseudagrion assegaii*	LC	3
Orthetrum angustiventre	LC	2	*Pseudagrion bicoerulans*	VU	6
Orthetrum austeni	LC	2	*Pseudagrion glaucescens*	LC	1
Orthetrum brachiale	LC	0	*Pseudagrion glaucoideum*	LC	1
Orthetrum caffrum	LC	3	*Pseudagrion hageni*	LC	2
Orthetrum camerunense	LC	3	*Pseudagrion hamoni*	LC	1
Orthetrum chrysostigma	LC	1	*Pseudagrion kersteni*	LC	1
Orthetrum guineense	LC	1	*Pseudagrion kibalense*	LC	4
Orthetrum hintzi	LC	1	*Pseudagrion massaicum*	LC	3
Orthetrum icteromelas	LC	1	*Pseudagrion melanicterum*	LC	0
Orthetrum julia	LC	1	*Pseudagrion niloticum*	LC	3
Orthetrum machadoi	LC	1	*Pseudagrion nubicum*	LC	0
Orthetrum microstigma	LC	0	*Pseudagrion rufocinctum*	LC	5
Orthetrum monardi	LC	1	*Pseudagrion salisburyense*	LC	2
Orthetrum saegeri	LC	2	*Pseudagrion sjoestedti*	LC	1
Orthetrum stemmale	LC	1	*Pseudagrion spernatum*	LC	2
Orthetrum trinacria	LC	1	*Pseudagrion sublacteum*	LC	1
Oxythemis phoenicosceles	LC	2	*Pseudagrion sudanicum*	LC	2
Palpopleura deceptor	LC	0	*Pseudagrion torridum*	LC	1
Palpopleura jucunda	LC	0	*Rhyothemis fenestrina*	LC	1
Palpopleura lucia	LC	0	*Rhyothemis semihyalina*	LC	1
Palpopleura portia	LC	0	*Stenocypha jacksoni*	NT	6
Pantala flavescens	LC	1	*Stenocypha molindica*	NT	7
Paragomphus cognatus	LC	2	*Stenocypha tenuis*	LC	4
Paragomphus elpidius	LC	2	*Tetrathemis camerunensis*	LC	0
Paragomphus genei	LC	1	*Tetrathemis corduliformis*	LC	4
Paragomphus viridior	LC	3	*Tetrathemis polleni*	LC	1
Parazyxomma flavicans	LC	1	*Thermochoria equivocata*	LC	4
Phaon iridipennis	LC	0	*Tholymis tillarga*	LC	0

Uganda: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Tramea basilaris	LC	0	*Trithemis pruinata*	LC	1
Tramea limbata	LC	0	*Trithemis stictica*	LC	0
Trithemis aconita	LC	0	*Trithemis werneri*	LC	2
Trithemis annulata	LC	0	*Trithetrum navasi*	LC	0
Trithemis arteriosa	LC	0	*Umma saphirina*	LC	3
Trithemis dichroa	LC	2	*Urothemis assignata*	LC	0
Trithemis donaldsoni	LC	3	*Urothemis edwardsii*	LC	0
Trithemis dorsalis	LC	3	*Zosteraeschna ellioti*	LC	3
Trithemis furva	LC	2	*Zygonoides fraseri*	LC	2
Trithemis grouti	LC	2	*Zygonyx flavicosta*	LC	2
Trithemis hecate	LC	1	*Zygonyx natalensis*	LC	2
Trithemis imitata	LC	1	*Zygonyx regisalberti*	LC	3
Trithemis integra	LC	5	*Zygonyx torridus*	LC	1
Trithemis kirbyi	LC	0	*Zyxomma atlanticum*	LC	3
Trithemis nuptialis	LC	2			

Western Sahara: (6 species, 11 records)

Species	RL	ADBI scores
Anax ephippiger	LC	1
Anax parthenope	LC	1
Crocothemis erythraea	LC	1
Ischnura saharensis	LC	3
Sympetrum fonscolombii	LC	0
Trithemis kirbyi	LC	0

Zambia: (224 species, 5 304 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Aciagrion africanum	LC	2	*Aethriamanta rezia*	LC	1
Aciagrion gracile	LC	2	*Africallagma fractum*	LC	4
Aciagrion heterostictum	LC	2	*Africallagma glaucum*	LC	3
Aciagrion nodosum	LC	4	*Africallagma pallidulum*	LC	4
Aciagrion steeleae	LC	4	*Africallagma pseudelongatum*	LC	3
Acisoma trifidum	LC	0	*Africallagma sinuatum*	LC	4
Aethiothemis basilewskyi	LC	4	*Africallagma subtile*	LC	0
Aethiothemis bequaerti	LC	3	*Africallagma vaginale*	LC	2
Aethiothemis ellioti	LC	3	*Afroaeschna scotias*	LC	5
Aethiothemis solitaria	LC	1	*Agriocnemis angolensis*	LC	4

Zambia: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Agriocnemis exilis	LC	1	*Diplacodes deminuta*	LC	3
Agriocnemis gratiosa	LC	2	*Diplacodes lefebvrii*	LC	1
Agriocnemis pinheyi	LC	3	*Diplacodes luminans*	LC	0
Agriocnemis ruberrima	LC	4	*Diplacodes pumila*	LC	3
Agriocnemis victoria	LC	1	*Elattoneura cellularis*	LC	3
Allocnemis marshalli	LC	5	*Elattoneura glauca*	LC	2
Allocnemis wittei	LC	4	*Eleuthemis quadrigutta*	LC	4
Anaciaeschna triangulifera	LC	1	*Gomphidia quarrei*	LC	2
Anax bangweuluensis	NT	5	*Gynacantha manderica*	LC	1
Anax chloromelas	LC	2	*Gynacantha nigeriensis*	LC	3
Anax congoliath	LC	3	*Gynacantha sextans*	LC	3
Anax ephippiger	LC	1	*Gynacantha vesiculata*	LC	3
Anax imperator	LC	1	*Gynacantha villosa*	LC	3
Anax speratus	LC	2	*Hadrothemis camarensis*	LC	4
Anax tristis	LC	1	*Hadrothemis defecta*	LC	1
Atoconeura biordinata	LC	3	*Hadrothemis scabrifrons*	LC	4
Atoconeura pseudeudoxia	LC	4	*Hadrothemis versuta*	LC	3
Azuragrion nigridorsum	LC	2	*Heliaeschna cynthiae*	LC	4
Brachythemis lacustris	LC	1	*Hemistigma albipunctum*	LC	0
Brachythemis leucosticta	LC	1	*Ictinogomphus dundoensis*	LC	3
Bradinopyga cornuta	LC	2	*Ictinogomphus ferox*	LC	1
Ceriagrion bakeri	LC	2	*Ictinogomphus regisalberti*	LC	2
Ceriagrion corallinum	LC	0	*Ischnura senegalensis*	LC	1
Ceriagrion glabrum	LC	0	*Lestes amicus*	LC	3
Ceriagrion katamborae	LC	4	*Lestes dissimulans*	LC	0
Ceriagrion sakejii	LC	3	*Lestes ictericus*	LC	1
Ceriagrion suave	LC	1	*Lestes ochraceus*	LC	1
Ceriagrion varians	LC	4	*Lestes pallidus*	LC	1
Ceriagrion whellani	LC	2	*Lestes pinheyi*	LC	2
Chalcostephia flavifrons	LC	1	*Lestes plagiatus*	LC	2
Chlorocypha consueta	LC	2	*Lestes tridens*	LC	0
Chlorocypha fabamacula	LC	3	*Lestes uncifer*	LC	2
Chlorocypha frigida	LC	6	*Lestes virgatus*	LC	2
Crenigomphus cornutus	LC	3	*Lestinogomphus angustus*	LC	2
Crenigomphus hartmanni	LC	2	*Malgassophlebia bispina*	LC	3
Crocothemis brevistigma	LC	4	*Mesocnemis singularis*	LC	0
Crocothemis divisa	LC	1	*Microgomphus nyassicus*	LC	5
Crocothemis erythraea	LC	1	*Neodythemis fitzgeraldi*	LC	3
Crocothemis sanguinolenta	LC	1	*Neodythemis klingi*	LC	2
Crocothemis saxicolor	LC	3	*Neodythemis preussi*	LC	3
Diastatomma selysi	LC	4	*Nesciothemis farinosa*	LC	1
Diastatomma soror	LC	3	*Nesciothemis fitzgeraldi*	LC	3

Zambia: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Neurogomphus cocytius	LC	3	*Phyllomacromia contumax*	LC	0
Neurogomphus zambeziensis	LC	3	*Phyllomacromia melania*	LC	3
Notiothemis robertsi	LC	3	*Phyllomacromia monoceros*	LC	4
Notogomphus praetorius	LC	2	*Phyllomacromia picta*	LC	2
Notogomphus zernyi	LC	3	*Phyllomacromia unifasciata*	LC	3
Olpogastra lugubris	LC	1	*Pinheyagrion angolicum*	LC	4
Onychogomphus kitchingmani	DD	5	*Pinheyschna rileyi*	LC	3
Onychogomphus seydeli	LC	3	*Platycypha caligata*	LC	2
Orthetrum abbotti	LC	1	*Platycypha lacustris*	LC	3
Orthetrum angustiventre	LC	2	*Porpax asperipes*	LC	3
Orthetrum austeni	LC	2	*Porpax risi*	LC	3
Orthetrum brachiale	LC	0	*Proischnura subfurcata*	LC	2
Orthetrum caffrum	LC	3	*Pseudagrion acaciae*	LC	2
Orthetrum chrysostigma	LC	1	*Pseudagrion assegaii*	LC	3
Orthetrum guineense	LC	1	*Pseudagrion coeleste*	LC	2
Orthetrum hintzi	LC	1	*Pseudagrion coeruleipunctum*	LC	4
Orthetrum icteromelas	LC	1	*Pseudagrion commoniae*	LC	3
Orthetrum julia	LC	1	*Pseudagrion deningi*	LC	4
Orthetrum machadoi	LC	1	*Pseudagrion fisheri*	LC	3
Orthetrum macrostigma	LC	4	*Pseudagrion gamblesi*	LC	2
Orthetrum microstigma	LC	0	*Pseudagrion glaucescens*	LC	1
Orthetrum monardi	LC	1	*Pseudagrion glaucoideum*	LC	1
Orthetrum robustum	LC	3	*Pseudagrion greeni*	LC	3
Orthetrum saegeri	LC	2	*Pseudagrion hageni*	LC	2
Orthetrum stemmale	LC	1	*Pseudagrion hamoni*	LC	1
Orthetrum trinacria	LC	1	*Pseudagrion helenae*	LC	3
Palpopleura albifrons	LC	3	*Pseudagrion inconspicuum*	LC	3
Palpopleura deceptor	LC	0	*Pseudagrion kersteni*	LC	1
Palpopleura jucunda	LC	0	*Pseudagrion kibalense*	LC	4
Palpopleura lucia	LC	0	*Pseudagrion makabusiense*	LC	3
Palpopleura portia	LC	0	*Pseudagrion massaicum*	LC	3
Pantala flavescens	LC	1	*Pseudagrion melanicterum*	LC	0
Paragomphus cataractae	NT	5	*Pseudagrion nubicum*	LC	0
Paragomphus cognatus	LC	2	*Pseudagrion rufostigma*	LC	3
Paragomphus elpidius	LC	2	*Pseudagrion salisburyense*	LC	2
Paragomphus genei	LC	1	*Pseudagrion sjoestedti*	LC	1
Paragomphus sabicus	LC	2	*Pseudagrion spernatum*	LC	2
Paragomphus zambeziensis	DD	4	*Pseudagrion sublacteum*	LC	1
Parazyxomma flavicans	LC	1	*Pseudagrion sudanicum*	LC	2
Phaon iridipennis	LC	0	*Rhyothemis fenestrina*	LC	1
Phyllogomphus selysi	LC	2	*Rhyothemis mariposa*	LC	4
Phyllomacromia aureozona	LC	4	*Rhyothemis semihyalina*	LC	1

Zambia: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Sympetrum fonscolombii	LC	0	*Trithemis monardi*	LC	4
Thermochoria jeanneli	LC	4	*Trithemis nuptialis*	LC	2
Tholymis tillarga	LC	0	*Trithemis palustris*	LC	4
Tramea basilaris	LC	0	*Trithemis pluvialis*	LC	2
Trithemis aconita	LC	0	*Trithemis pruinata*	LC	1
Trithemis aequalis	NT	4	*Trithemis stictica*	LC	0
Trithemis annulata	LC	0	*Trithemis werneri*	LC	2
Trithemis anomala	LC	3	*Trithetrum navasi*	LC	0
Trithemis arteriosa	LC	0	*Umma electa*	LC	3
Trithemis bifida	LC	0	*Urothemis assignata*	LC	0
Trithemis dichroa	LC	2	*Urothemis edwardsii*	LC	0
Trithemis donaldsoni	LC	3	*Zosteraeschna usambarica*	LC	4
Trithemis dorsalis	LC	3	*Zygonoides fuelleborni*	LC	2
Trithemis furva	LC	2	*Zygonyx atritibiae*	LC	3
Trithemis grouti	LC	2	*Zygonyx eusebia*	LC	2
Trithemis hecate	LC	1	*Zygonyx flavicosta*	LC	2
Trithemis kirbyi	LC	0	*Zygonyx natalensis*	LC	2
Trithemis leakeyi	LC	3	*Zygonyx torridus*	LC	1

Zimbabwe: (153 species, 4 182 records)

Species	RL	ADBI scores	Species	RL	ADBI scores
Aciagrion dondoense	LC	3	*Atoconeura biordinata*	LC	3
Aciagrion gracile	LC	2	*Azuragrion nigridorsum*	LC	2
Acisoma inflatum	LC	0	*Brachythemis lacustris*	LC	1
Acisoma variegatum	LC	3	*Brachythemis leucosticta*	LC	1
Aethiothemis solitaria	LC	1	*Bradinopyga cornuta*	LC	2
Aethriamanta rezia	LC	1	*Ceratogomphus pictus*	LC	3
Africallagma cuneistigma	NT	6	*Ceriagrion corallinum*	LC	0
Africallagma fractum	LC	4	*Ceriagrion glabrum*	LC	0
Africallagma glaucum	LC	3	*Ceriagrion suave*	LC	1
Africallagma sinuatum	LC	4	*Ceriagrion whellani*	LC	2
Africallagma subtile	LC	0	*Chalcostephia flavifrons*	LC	1
Agriocnemis exilis	LC	1	*Chlorocypha consueta*	LC	2
Agriocnemis pinheyi	LC	3	*Chlorolestes elegans*	NT	5
Allocnemis marshalli	LC	5	*Crenigomphus cornutus*	LC	3
Anax ephippiger	LC	1	*Crenigomphus hartmanni*	LC	2
Anax imperator	LC	1	*Crocothemis divisa*	LC	1
Anax speratus	LC	2	*Crocothemis erythraea*	LC	1
Anax tristis	LC	1	*Crocothemis sanguinolenta*	LC	1

Zimbabwe: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Crocothemis saxicolor	LC	3	*Orthetrum hintzi*	LC	1
Diplacodes lefebvrii	LC	1	*Orthetrum icteromelas*	LC	1
Diplacodes luminans	LC	0	*Orthetrum julia*	LC	1
Diplacodes pumila	LC	3	*Orthetrum machadoi*	LC	1
Elattoneura cellularis	LC	3	*Orthetrum stemmale*	LC	1
Elattoneura glauca	LC	2	*Orthetrum trinacria*	LC	1
Eleuthemis quadrigutta	LC	4	*Palpopleura deceptor*	LC	0
Gomphidia quarrei	LC	2	*Palpopleura jucunda*	LC	0
Gynacantha manderica	LC	1	*Palpopleura lucia*	LC	0
Gynacantha villosa	LC	3	*Palpopleura portia*	LC	0
Hadrothemis scabrifrons	LC	4	*Pantala flavescens*	LC	1
Hemistigma albipunctum	LC	0	*Paragomphus cataractae*	NT	5
Ictinogomphus ferox	LC	1	*Paragomphus cognatus*	LC	2
Ischnura senegalensis	LC	1	*Paragomphus elpidius*	LC	2
Lestes amicus	LC	3	*Paragomphus genei*	LC	1
Lestes dissimulans	LC	0	*Paragomphus magnus*	LC	3
Lestes ictericus	LC	1	*Paragomphus sabicus*	LC	2
Lestes ochraceus	LC	1	*Paragomphus zambeziensis*	DD	4
Lestes pallidus	LC	1	*Parazyxomma flavicans*	LC	1
Lestes pinheyi	LC	2	*Phaon iridipennis*	LC	0
Lestes plagiatus	LC	2	*Phyllogomphus selysi*	LC	2
Lestes tridens	LC	0	*Phyllomacromia contumax*	LC	0
Lestes uncifer	LC	2	*Phyllomacromia monoceros*	LC	4
Lestes virgatus	LC	2	*Phyllomacromia picta*	LC	2
Lestinogomphus angustus	LC	2	*Pinheyschna rileyi*	LC	3
Lestinogomphus silkeae	DD	4	*Platycypha caligata*	LC	2
Mesocnemis singularis	LC	0	*Platycypha fitzsimonsi*	LC	3
Microgomphus nyassicus	LC	5	*Platycypha inyangae*	VU	6
Nesciothemis farinosa	LC	1	*Porpax risi*	LC	3
Neurogomphus cocytius	LC	3	*Proischnura subfurcata*	LC	2
Neurogomphus zambeziensis	LC	3	*Pseudagrion acaciae*	LC	2
Notiothemis jonesi	LC	3	*Pseudagrion assegaii*	LC	3
Notogomphus dendrohyrax	LC	3	*Pseudagrion coeleste*	LC	2
Notogomphus praetorius	LC	2	*Pseudagrion commoniae*	LC	3
Notogomphus zernyi	LC	3	*Pseudagrion deningi*	LC	4
Olpogastra lugubris	LC	1	*Pseudagrion gamblesi*	LC	2
Onychogomphus supinus	LC	3	*Pseudagrion glaucescens*	LC	1
Orthetrum abbotti	LC	1	*Pseudagrion hageni*	LC	2
Orthetrum brachiale	LC	0	*Pseudagrion hamoni*	LC	1
Orthetrum caffrum	LC	3	*Pseudagrion kersteni*	LC	1
Orthetrum chrysostigma	LC	1	*Pseudagrion makabusiense*	LC	3
Orthetrum guineense	LC	1	*Pseudagrion massaicum*	LC	3

Zimbabwe: (*continued*)

Species	RL	ADBI scores	Species	RL	ADBI scores
Pseudagrion nubicum	LC	0	*Trithemis donaldsoni*	LC	3
Pseudagrion rufostigma	LC	3	*Trithemis dorsalis*	LC	3
Pseudagrion salisburyense	LC	2	*Trithemis furva*	LC	2
Pseudagrion sjoestedti	LC	1	*Trithemis hecate*	LC	1
Pseudagrion spernatum	LC	2	*Trithemis kirbyi*	LC	0
Pseudagrion sublacteum	LC	1	*Trithemis monardi*	LC	4
Pseudagrion sudanicum	LC	2	*Trithemis pluvialis*	LC	2
Pseudagrion vumbaense	NT	6	*Trithemis stictica*	LC	0
Rhyothemis semihyalina	LC	1	*Trithemis werneri*	LC	2
Sympetrum fonscolombii	LC	0	*Trithetrum navasi*	LC	0
Tetrathemis polleni	LC	1	*Urothemis assignata*	LC	0
Tholymis tillarga	LC	0	*Urothemis edwardsii*	LC	0
Tramea basilaris	LC	0	*Zosteraeschna usambarica*	LC	4
Tramea limbata	LC	0	*Zygonoides fuelleborni*	LC	2
Trithemis aconita	LC	0	*Zygonyx natalensis*	LC	2
Trithemis annulata	LC	0	*Zygonyx torridus*	LC	1
Trithemis arteriosa	LC	0			

APPENDIX C4: The level of data coverage in the 48 African countries.

Assessing the level of data coverage for each of the 48 African countries. This was done by multiplying the number of records with the number of species recorded for each country, which was then divided by the size (km^2) of that country. The 48 countries were rearranged from highest to lowest coverage, which were then divided into four quartiles each containing 12 countries. The countries in the first and second quartiles have excellent (first quartile) to good (second quartile) quality data coverage. Therefore, these countries have the potential for immediate development of national Dragonfly Biotic Index (DBI) scores due to the availability of sufficient data with no or very few (first quartile) to slight (second quartile) amendments to the data. The countries in the third and fourth quartiles have modest (third quartile) to very poor (fourth quartile) quality data coverage. These countries may have insufficient data for developing national DBI scores straight away (e.g. too few distribution records). The South Africa records are included only as a reference, since the country already has a national DBI.

Quartiles	No.	Country	Number of records	Number of spp.	Country size (km2)	Coverage
		South Africa	25 682	162	1 200 000	3.4671
First	1	Gambia	1 337	75	11 300	8.8739
	2	Gabon	9 973	223	267 668	8.3087
	3	Liberia	4 054	185	111 369	6.7343
	4	Uganda	4 599	213	241 551	4.0554
	5	Malawi	2 727	144	118 484	3.3143
	6	Sierra Leone	1 332	155	71 740	2.8779
	7	Zimbabwe	4 182	153	390 757	1.6375
	8	Zambia	5 304	224	752 618	1.5786
	9	Cameroon	3 341	213	475 650	1.4961
	10	Botswana	6 566	120	582 000	1.3538
	11	Ghana	1 900	167	238 391	1.3310
	12	Namibia	8 024	124	824 292	1.2071

APPENDIX C4: (*continued*)

Quartiles	No.	Country	Number of records	Number of spp.	Country size (km2)	Coverage
Second	13	Democratic Republic of Congo	6 044	332	2 344 858	0.8557
	14	Kenya	2 918	163	580 000	0.8201
	15	Tunisia	2 444	54	163 610	0.8066
	16	Togo	477	91	56 785	0.7644
	17	Benin	887	92	112 622	0.7246
	18	Swaziland	237	52	17 364	0.7097
	19	Guinea-Bissau	393	64	36 000	0.6987
	20	Congo, Republic of	1 432	156	342 000	0.6532
	21	Morocco	4 188	60	446 550	0.5627
	22	Cote d'Ivoire	785	152	322 463	0.3700
	23	Tanzania	1 948	174	945 087	0.3586
	24	Nigeria	1 606	203	923 768	0.3529
Third	25	Angola	2 181	195	1 246 700	0.3411
	26	Mozambique	1 956	137	801 590	0.3343
	27	Equatorial Guinea	108	69	28 000	0.2661
	28	Senegal	671	66	196 722	0.2251
	29	Guinea	431	107	245 857	0.1876
	30	Ethiopia	1 000	99	1 126 829	0.0879
	31	Rwanda	50	41	26 338	0.0778
	32	Central African Republic	385	105	622 984	0.0649
	33	Burkina Faso	269	59	274 222	0.0579

APPENDIX C4: (*continued*)

Quartiles	No.	Country	Number of records	Number of spp.	Country size (km2)	Coverage
Third	34	Algeria	1 934	60	2 380 000	0.0488
(*cont.*)	35	Egypt	1 211	32	1 000 000	0.0388
	36	Somalia	371	55	637 657	0.0320
Fourth	37	Mali	416	71	1 241 238	0.0238
	38	Sudan	558	55	1 861 484	0.0165
	39	South Sudan	167	58	644 329	0.0150
	40	Chad	251	45	1 284 000	0.0088
	41	Djibouti	20	8	23 200	0.0069
	42	Eritrea	35	20	117 600	0.0060
	43	Mauritania	255	24	1 030 000	0.0059
	44	Lesotho	15	12	30 355	0.0059
	45	Burundi	13	11	27 834	0.0051
	46	Niger	215	30	1 267 000	0.0051
	47	Libya	309	28	1 759 540	0.0049
	48	Western Sahara	11	6	267 000	0.0002

APPENDIX C5: The level of data coverage and the range of Dragonfly Biotic Index (DBI) scores in the 48 African countries.

Assessing the level of data coverage, as well as the range of Dragonfly Biotic Index (DBI) scores, for each of the 48 African countries. This was done by multiplying the number of records with the number of species of each country, which was then multiplied by the number of DBI points of the relevant countries. These values were then divided by the size (km^2) of the related countries. The DBI points were calculated using the range of DBI scores (ADBI and South African DBI), e.g. range of DBI scores 0 to 9 = 10 points. The 48 countries were sorted from highest to lowest coverage, which were then divided into four quartiles each containing 12 countries. The countries in the first and second quartiles have excellent (first quartile) to good (second quartile) quality data coverage. Therefore, these countries have the potential for immediate development of national DBI scores due to the availability of sufficient data with no or very few (first quartile) to slight (second quartile) amendments to the data. The countries in the third and fourth quartiles have modest (third quartile) to very poor (fourth quartile) quality data coverage. These countries may have insufficient data for developing national DBI scores straight away, i.e. too few distribution records and inadequate range of ADBI scores. The South Africa records are included only as a reference, since the country already has a national DBI.

Quartiles	No.	Country	Number of records	Number of spp.	DBI range	DBI points	Country size (km2)	Coverage with DBI range
		South Africa	25 682	162	0 – 9	10	1 200 000	34.6707
First	1	Gabon	9 973	223	0 – 6	7	267 668	58.1611
	2	Liberia	4 054	185	0 – 6, 8	8	111 369	53.8742
	3	Uganda	4 599	213	0 – 8	9	241 551	36.4986
	4	Gambia	1 337	75	0 – 3	4	11 300	35.4956
	5	Malawi	2 727	144	0 – 6, 9	8	118 484	26.5142
	6	Sierra Leone	1 332	155	0 – 5	6	71 740	17.2674
	7	Cameroon	3 341	213	0 – 7, 9	9	475 650	13.4651
	8	Zimbabwe	4 182	153	0 – 6	7	390 757	11.4622

APPENDIX C5: (*continued*)

Quartiles	No.	Country	Number of records	Number of spp.	DBI range	DBI points	Country size (km2)	Coverage with DBI range
First	9	Zambia	5 304	224	0 – 6	7	752 618	11.0503
(*cont*.)	10	Kenya	2 918	163	0 – 9	10	580 000	8.2006
	11	Botswana	6 566	120	0 – 5	6	582 000	8.1229
	12	Ghana	1 900	167	0 – 5	6	238 391	7.9860
Second	13	Namibia	8 024	124	0 – 5	6	824 292	7.2424
	14	Democratic Republic of Congo	6 044	332	0 – 7	8	2 344 858	6.8460
	15	Tunisia	2 444	54	0 – 7	8	163 610	6.4532
	16	Togo	477	91	0 – 5	6	56 785	4.5865
	17	Congo, Republic of	1 432	156	0 – 6	7	342 000	4.5724
	18	Benin	887	92	0 – 5	6	112 622	4.3475
	19	Swaziland	237	52	0 – 5	6	17 364	4.2585
	20	Morocco	4 188	60	0 – 5, 7	7	446 550	3.9390
	21	Guinea-Bissau	393	64	0 – 4	5	36 000	3.4933
	22	Tanzania	1 948	174	0 – 7, 9	9	945 087	3.2278
	23	Nigeria	1 606	203	0 – 5, 7, 9	8	923 768	2.8234
	24	Mozambique	1 956	137	0 – 6	7	801 590	2.3401
Third	25	Cote d'Ivoire	785	152	0 – 5	6	322 463	2.2202
	26	Angola	2 181	195	0 – 5	6	1 246 700	2.0468
	27	Equatorial Guinea	108	69	0 – 5	6	28 000	1.5969
	28	Senegal	671	66	0 – 5	6	196 722	1.3507

APPENDIX C5: (*continued*)

Quartiles	No.	Country	Number of records	Number of spp.	DBI range	DBI points	Country size (km2)	Coverage with DBI range
Third	29	Guinea	431	107	0 – 6	7	245 857	1.3130
(*cont*.)	30	Ethiopia	1 000	99	0 – 9	10	112 6829	0.8786
	31	Rwanda	50	41	0 – 4, 6	6	26 338	0.4670
	32	Algeria	1 934	60	0 – 7	8	2 380 000	0.3901
	33	Central African Republic	385	105	0 – 5	6	622 984	0.3893
	34	Burkina Faso	269	59	0 – 3	4	274 222	0.2315
	35	Egypt	1 211	32	0 – 4	5	1 000 000	0.1938
	36	Mali	416	71	0 – 5	6	1 241 238	0.1428
Fourth	37	Somalia	371	55	0 – 3	4	637 657	0.1280
	38	South Sudan	167	58	0 – 5	6	644 329	0.0902
	39	Sudan	558	55	0 – 4	5	1 861 484	0.0824
	40	Chad	251	45	0 – 3	4	1 284 000	0.0352
	41	Eritrea	35	20	0 – 4	5	117 600	0.0298
	42	Lesotho	15	12	0 – 4	5	30 355	0.0296
	43	Burundi	13	11	0 – 4	5	27 834	0.0257
	44	Libya	309	28	0 – 4	5	1 759 540	0.0246
	45	Djibouti	20	8	0 – 1, 4	3	23 200	0.0207
	46	Niger	215	30	0 – 1, 3 – 4	4	1 267 000	0.0204
	47	Mauritania	255	24	0 – 1, 3	3	1 030 000	0.0178
	48	Western Sahara	11	6	0 – 1, 3	3	267 000	0.0007

CHAPTER 5

Value of a dragonfly freshwater assessment index across the terrestrial and freshwater ecoregions of Africa

ABSTRACT

Africa's freshwater ecosystems are being greatly impacted by human activities. We need to assess the magnitude of these impacts and how they may alter the natural state of the freshwaters. The focus here is on a biomonitoring tool, the African Dragonfly Biotic Index (ADBI). Normally, bioassessments and conservation of freshwaters occur at two levels: 1) the political borders of a country, and 2) the biogeographical regions of a country or continent. However, as with conservation in general, what is expedient at the national level usually does not match well with biogeographical categories such as ecoregions, either terrestrial or freshwater. Thus, the aim here is to investigate the value of the ADBI for assessing African freshwaters using terrestrial and freshwater ecoregions, a finer spatial scale, and therefore a more accurate assessment method, than the ADBI as a continental scale index. This was accomplished by determining the dragonfly assemblages of these two sets of ecoregions, and determining how they compare. It was found that there are no overall significant differences between assessments, which use either the terrestrial or the freshwater ecoregions in terms of their dragonfly assemblages. However, using terrestrial ecoregions gives a finer interpretation of freshwater condition, as manifested by the dragonflies present, than do assessments using freshwater ecoregions.

Abbreviations used: ADBI – African Dragonfly Biotic Index; ADHM – African Dragonfly Habitat Matrix; DBI – Dragonfly Biotic Index (South Africa); IUCN/SSC – International Union for the Conservation of Nature/Species Survival Commission; ODA – Odonata Database of Africa.

1. INTRODUCTION

Globally, freshwater ecosystems are under threat from anthropogenic activities (Revenga *et al.* 2005; Dudgeon *et al.* 2006; Butchart *et al.* 2010). These activities include habitat degradation, pollution, dam building, poor water management, and invasive alien species, all of which contribute to the loss of indigenous freshwater biodiversity (Revenga *et al.* 2005; Dudgeon *et al.* 2006). African freshwater ecosystems are rich in biodiversity (Darwall *et al.* 2011), while being impacted by the same anthropogenic threats as in many other parts of the world (UNEP 2002; Revenga *et al.* 2005; Dudgeon *et al.* 2006; Darwall *et al.* 2011). This means that there is some urgency to conserve these systems and their species diversity across the continent. A first step is to put in place assessment protocols based on the collation of existing data on freshwater taxa (e.g. fish, plants and insects) (Darwall *et al.* 2011).

One taxon that is highly effective for assessments of water condition is the Odonata (true dragonflies and damselflies), collectively known as 'dragonflies' (Clark & Samways 1996; Smith *et al.* 2007; Oertli 2008; De Olieveira-Junior *et al.* 2015). Dragonflies enable the assessment and ranking of freshwater bodies according to their health and ecological integrity (e.g. Samways 2005; Silva *et al.* 2010; Simaika & Samways 2011; Kutcher & Bried 2014; Chovanec *et al.* 2015; Dutra & De Marco 2015; Golfieri *et al.* 2016; Martín & Maynou 2016; Valente-Neto *et al.* 2016). They are especially suitable as an assessment tool as they are a suite of species with a range of sensitivities and traits. Different assemblages characterize different water body types. At one particular water body, a change in species assemblages indicates some change in the condition of that water body (Samways & Simaika 2016). This is because dragonflies are sensitive to changing biotope structure and condition (Samways & Sharratt 2010), as well as in-water conditions (Kietzka *et al.* 2017). Dragonflies are also mobile, responding to changing environmental conditions, either by moving towards them when favourable, or away from them when not. These freshwater species are also relatively easy to identify in the field, as they are taxonomically well-known and conspicuous (Corbet 1999; Kalkman *et al.* 2008). As regards to the African continent, this has enabled the development of a substantial database of the species across the continent (e.g. Kipping *et al.* 2009; Dijkstra *et al.* 2011; Clausnitzer *et al.* 2012; Dijkstra & Clausnitzer 2014).

Dragonflies as a freshwater assessment tool have been widely used in South Africa in the form of the Dragonfly Biotic Index (DBI) (Samways & Taylor 2004; Simaika & Samways 2009, 2011, 2012; Samways & Simaika 2016). The DBI is based on the presence of specific dragonfly species (both true dragonflies and damselflies) at focal sites. Each species has its own DBI score, which is derived from the total of three sub-indices: 1) the species' geographical distribution, 2) its International Union for the Conservation of Nature/Species Survival Commission (IUCN/SSC) Red

List threat status, and 3) its sensitivity to anthropogenic disturbance to its habitat. The scores of each of these DBI sub-indices range from 0 to 3, with the final DBI value of each species being the sum of scores for the three sub-indices, and ranging from 0 to 9.

Using the South African DBI as a template, and collating the pan-African species data (Kipping *et al.* 2009), a biomonitoring tool was created for the entire African continent: the African Dragonfly Biotic Index (ADBI) (see Chapter 2). The goal of the ADBI is for conservation planning and actions across the continent. However, conservation planning is usually based on conservation-action units at two levels: 1) the political borders of countries, and 2) the biogeographical regions of a country or continent. The ADBI scores 0 – 9 have been interrogated in detail relative to the political borders of the African countries. Yet, the ADBI lacks some currency as an assessment tool as it is a generalization for the whole continent. In response, the ADBI (0 – 9) was adjusted to be more effective at the spatial level of nation states (see Chapter 4). As with conservation in general, what is expedient at the national level, usually does not match well with ecological processes and patterns of biodiversity (Olson & Dinerstein 1998). However, biogeographical categories such as ecoregions, which have been determined using expert opinion for both terrestrial (Olson *et al.* 2001) and freshwater (Abell *et al.* 2008) ecoregions, help guide conservation decisions.

The main aim here is to investigate the value of the ADBI scores (0 – 9) for assessment of African freshwaters at a finer spatial scale, and therefore a more accurate assessment method, than the ADBI as a continental scale index. Thus, the ADBI scores were considered across the biogeographical categories, terrestrial (Olson *et al.* 2001) and freshwater ecoregions (Abell *et al.* 2008). This was accomplished by first determining the dragonfly species assemblages for each terrestrial and freshwater ecoregion, and then evaluating the species' assigned ADBI scores (0 – 9). The terrestrial and freshwater ecoregions were then compared, as well as a ranked, according to their biotic value, i.e. their comparative, assigned ADBI scores. Accordingly, the null hypothesis, is that both the terrestrial and freshwater ecoregions have equal value according to the species composition and therefore, the recorded ADBI scores (0 – 9).

2. METHODS

2.1 Background on the African Dragonfly Biotic Index (ADBI)

The ADBI has the same basic paradigm as the South African Dragonfly Biotic Index (DBI), but with a continental perspective. The ADBI consists of three sub-indices: 1) the species' geographical distribution, 2) their IUCN/SSC Red List threat status, and 3) their vulnerability to anthropogenic disturbances affecting their habitat. Any one species has a sub-index score ranging from 0 – 3, and,

adding the three sub-index scores together, can have a total score of 0 – 9. As the ADBI is a continental scale index, it means that: 1) the scoring for the species' IUCN/SSC Red List threat status is done only at the global (i.e. not national) scale, 2) its geographical distribution is determined at the continental scale (African continent), and 3) the species' vulnerability to anthropogenic disturbance is also assessed at a continental scale, i.e. by measuring the adverse anthropogenic impacts to any one species' preferred habitat, and its sensitivity to disturbance at a continental scale. This results in the ADBI scores slightly deviating from those of the original South African DBI scores (see Chapter 3).

Here the three sub-indices of the ADBI were calculated as follows. The ADBI geographical distribution sub-index was calculated using a comprehensive spatial database of individually recorded dragonfly species across the African continent: the Odonata Database of Africa (ODA; Kipping *et al.* 2009). Geographical coordinates recorded within this database were used to determine the latitude-longitude range sizes of all selected species across Africa, and these range sizes were divided into four categories represented by the sub-scores 0 – 3 (see Chapter 2). The ADBI threat status sub-index for each species was determined using the global IUCN/SSC Red List threat status using the IUCN Red List Categories and Criteria, version 3.1, second edition (IUCN 2016). These Red List threat statuses were also divided into four categories represented by the sub-scores 0 – 3 (see Chapter 2). The Red List threat status for each species was extracted from the website www.iucnredlist.org.

The ADBI species vulnerability sub-index was determined using a habitat matrix, the African Dragonfly Habitat Matrix (ADHM), created by 15 dragonfly specialists who described the preference of each dragonfly species for a particular habitat. This sub-index represents the vulnerability of each species' habitat to specific anthropogenic disturbances (i.e. habitat conversion, water management and the presence of invasive alien trees), and secondly, the vulnerability each species may have to these impacts within their particular habitats. The vulnerability sub-index was also divided into four categories representing the sub-scores 0 – 3 (see Chapter 2).

2.2 Data

Data points were based on approximately 115 000 dragonfly distribution records collated in the ODA, as well as the ADBI scores (0 – 9) that were created for each of 604 African dragonfly species (see Chapter 2). The data points were assigned to the 105 terrestrial ecoregions of Olson *et al.* (2001) (Table 5.1 and Fig. 5.1) and the 78 freshwater ecoregions of Abell *et al.* (2008) (Table 5.2 and Fig. 5.2) of mainland Africa (oceanic islands were excluded). The ecological boundaries of these terrestrial and freshwater ecoregions were obtained from The Nature Conservancy (2013) website.

Table 5.1. The biogeographical environment of the African continent are illustrated by 105 terrestrial ecoregions (numbered 1 to 105), as described by Olson *et al.* (2001) and obtained from The Nature Conservancy (2013). These numbered ecoregions are also shown in Figure 5.1.

No.	Terrestrial ecoregion names	No.	Terrestrial ecoregion names	No.	Terrestrial ecoregion names
1	Albertine Rift Montane Forests	17	Niger Delta Swamp Forests	33	Kalahari Acacia-Baikiaea Woodlands
2	Atlantic Equatorial Coastal Forests	18	Nigerian Lowland Forests	34	Mandara Plateau Mosaic
3	Cameroonian Highlands Forests	19	Northeastern Congolian Lowland Forests	35	Northern Acacia-Commiphora Bushlands and Thickets
4	Central Congolian Lowland Forests	20	Northern Zanzibar-Inhambane Coastal Forest Mosaic	36	Northern Congolian Forest-Savanna Mosaic
5	Cross-Niger Transition Forests	21	Northwestern Congolian Lowland Forests	37	Sahelian Acacia Savanna
6	Cross-Sanaga-Bioko Coastal Forests	22	Southern Zanzibar-Inhambane Coastal Forest Mosaic	38	Serengeti Volcanic Grasslands
7	East African Montane Forests	23	Western Congolian Swamp Forests	39	Somali Acacia-Commiphora Bushlands and Thickets
8	Eastern Arc Forests	24	Western Guinean Lowland Forests	40	Southern Acacia-Commiphora Bushlands and Thickets
9	Eastern Congolian Swamp Forests	25	Zambezian Cryptosepalum Dry Forests	41	Southern Africa Bushveld
10	Eastern Guinean Forests	26	Angolan Miombo Woodlands	42	Southern Congolian Forest-Savanna Mosaic
11	Ethiopian Montane Forests	27	Angolan Mopane Woodlands	43	Southern Miombo Woodlands
12	Guinean Montane Forests	28	Central Zambezian Miombo Woodlands	44	Victoria Basin Forest-Savanna Mosaic
13	Knysna-Amatole Montane Forests	29	East Sudanian Savanna	45	West Sudanian Savanna
14	Kwazulu-Cape Coastal Forest Mosaic	30	Eastern Miombo Woodlands	46	Western Congolian Forest-Savanna Mosaic
15	Maputaland Coastal Forest Mosaic	31	Guinean Forest-Savanna Mosaic	47	Western Zambezian Grasslands
16	Mount Cameroon and Bioko Montane Forests	32	Itigi-Sumbu Thicket	48	Zambezian and Mopane Woodlands

Table 5.1. *Continued.*

No.	Terrestrial ecoregion names	No.	Terrestrial ecoregion names	No.	Terrestrial ecoregion names
49	Zambezian Baikiaea Woodlands	68	Maputaland-Pondoland Bushland and Thickets	87	Succulent Karoo
50	East African Halophytics	69	Ruwenzori-Virunga Montane Moorlands	88	Central African Mangroves
51	Etosha Pan Halophytics	70	South Malawi Montane Forest-Grassland Mosaic	89	East African Mangroves
52	Inner Niger Delta Flooded Savanna	71	Southern Rift Montane Forest-Grassland Mosaic	90	Guinean Mangroves
53	Lake Chad Flooded Savanna	72	Albany Thickets	91	Southern Africa Mangroves
54	Saharan Flooded Grasslands	73	Lowland Fynbos and Renosterveld	92	Lake: Afrotropic
55	Zambezian Coastal Flooded Savanna	74	Montane Fynbos and Renosterveld	93	Mediterranean Conifer and Mixed Forests
56	Zambezian Flooded Grasslands	75	East Saharan Montane Xeric Woodlands	94	Nile Delta Flooded Savanna
57	Zambezian Halophytics	76	Eritrean Coastal Desert	95	Saharan Halophytics
58	Angolan Montane Forest-Grassland Mosaic	77	Ethiopian Xeric Grasslands and Shrublands	96	Mediterranean High Atlas Juniper Steppe
59	Angolan Scarp Savanna and Woodlands	78	Hobyo Grasslands and Shrublands	97	Mediterranean Acacia-Argania Dry Woodlands and Succulent Thickets
60	Drakensberg Alti-Montane Grasslands and Woodlands	79	Kalahari Xeric Savanna	98	Mediterranean Dry Woodlands and Steppe
61	Drakensberg Montane Grasslands, Woodlands and Forests	80	Kaokoveld Desert	99	Mediterranean Woodlands and Forests
62	East African Montane Moorlands	81	Masai Xeric Grasslands and Shrublands	100	Atlantic Coastal Desert
63	Eastern Zimbabwe Montane Forest-Grassland Mosaic	82	Nama Karoo	101	North Saharan Steppe and Woodlands
64	Ethiopian Montane Grasslands and Woodlands	83	Namib Desert	102	Sahara Desert
65	Ethiopian Montane Moorlands	84	Namibian Savanna Woodlands	103	South Saharan Steppe and Woodlands
66	Highveld Grasslands	85	Red Sea Coastal Desert	104	Tibesti-Jebel Uweinat Montane Xeric Woodlands
67	Jos Plateau Forest-Grassland Mosaic	86	Somali Montane Xeric Woodlands	105	West Saharan Montane Xeric Woodlands

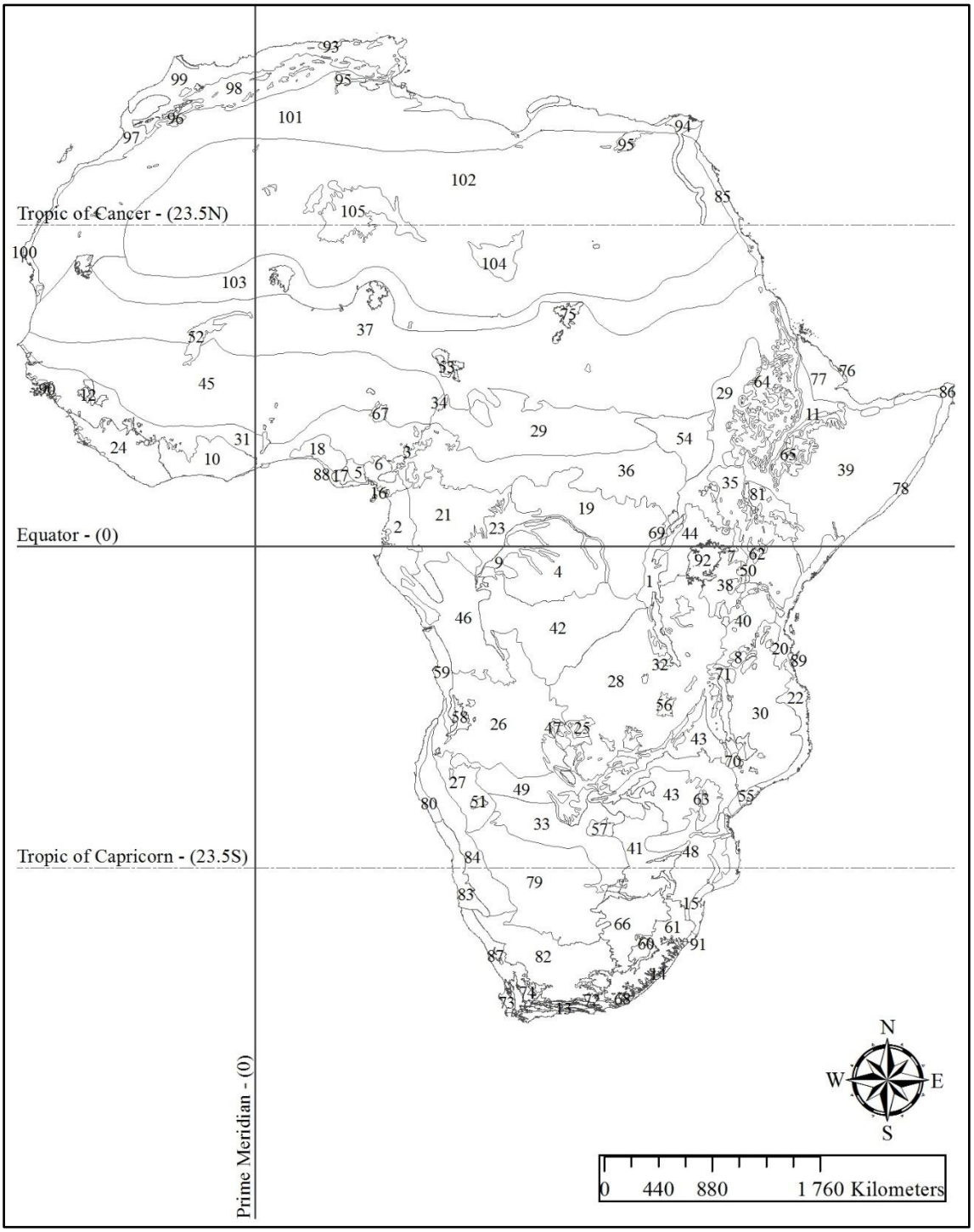


Figure 5.1. A map of the 105 terrestrial ecoregions of the African continent (described by Olson *et al.* 2001), as obtained from The Nature Conservancy (2013).

Table 5.2. The biogeographical environment of the African continent can be illustrated by 78 freshwater ecoregions (numbered 1 to 78), as described by Abell *et al.* (2008) and obtained from The Nature Conservancy (2013). These numbered ecoregions are also shown in Figure 5.2.

No.	Freshwater ecoregion names	No.	Freshwater ecoregion names	No.	Freshwater ecoregion names
1	Atlantic Northwest Africa	27	Western Red Sea Drainages	53	Etosha
2	Mediterranean Northwest Africa	28	Northern Eastern Rift	54	Karstveld Sink Holes
3	Sahara	29	Horn of Africa	55	Zambezian Headwaters
4	Dry Sahel	30	Lake Turkana	56	Upper Zambezi Floodplains
5	Lower Niger – Benue	31	Shebelle – Juba	57	Kafue
6	Niger Delta	32	Ogooue – Nyanga – Kouilou – Niari	58	Middle Zambezi – Luangwa
7	Upper Niger	33	Southern Gulf of Guinea Drainages – Bioko	59	Lake Malawi
8	Inner Niger Delta	34	Sangha	60	Zambezian Highveld
9	Senegal – Gambia	35	Sudanic Congo – Oubangi	61	Lower Zambezi
10	Fouta – Djalon	36	Uele	62	Mulanje
11	Northern Upper Guinea	37	Cuvette Centrale	63	Eastern Zimbabwe Highlands
12	Southern Upper Guinea	38	Tumba	64	Coastal East Africa
13	Mount Nimba	39	Upper Congo Rapids	65	Lake Rukwa
14	Eburneo	40	Upper Congo	66	Southern Eastern Rift
15	Ashanti	41	Albertine Highlands	67	Tana, Athi & Coastal Drainages
16	Volta	42	Lake Tanganyika	68	Pangani
17	Bight Drainages	43	Malagarasi – Moyowosi	69	Okavango
18	Northern Gulf of Guinea Drainages	44	Bangweulu – Mweru	70	Kalahari
19	Western Equatorial Crater Lakes	45	Upper Lualaba	71	Southern Kalahari
20	Lake Chad	46	Kasai	72	Western Orange
21	Lake Victoria Basin	47	Mai Ndombe	73	Karoo
22	Upper Nile	48	Malebo Pool	74	Drakensberg – Maloti Highlands
23	Lower Nile	49	Lower Congo Rapids	75	Southern Temperate Highveld
24	Nile Delta	50	Lower Congo	76	Zambezian Lowveld
25	Ethiopian Highlands	51	Cuanza	77	Amatolo – Winterberg Highlands
26	Lake Tana	52	Namib	78	Cape Fold

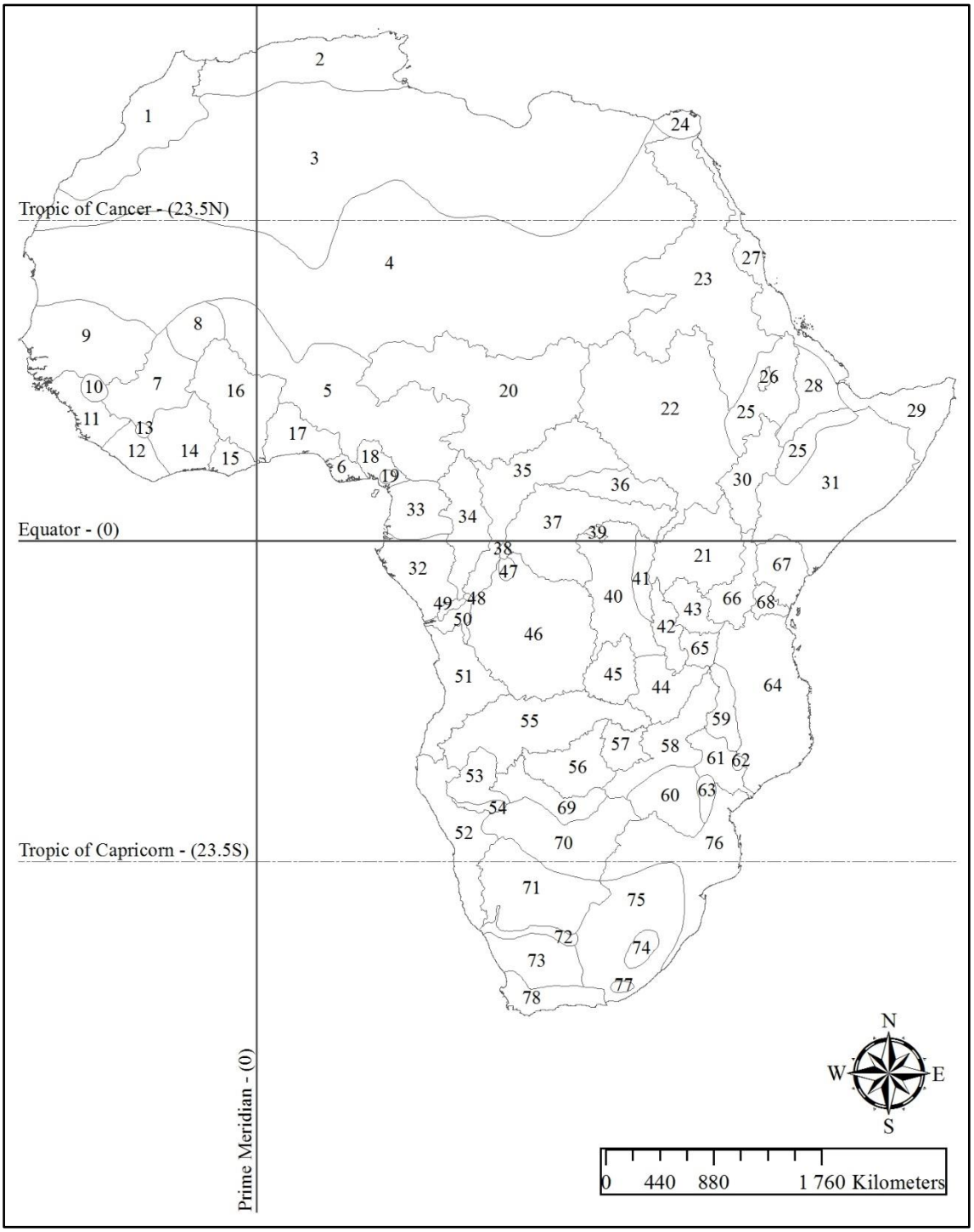


Figure 5.2. The 78 freshwater ecoregions of the African continent (described by Abell *et al.* 2008), as obtained from The Nature Conservancy (2013).

2.3 Data analyses

To determine which set of ecoregions, terrestrial and/or freshwater, best described the species assemblages, and thus the ADBI scores (0 – 9), the data were interrogated in terms of: 1) the geographical range extent of the species within the ecoregions, 2) the similarity of species recorded within specific ecoregions, and 3) the ADBI scores (0 – 9). However, three of the 105 terrestrial ecoregions (i.e. Western Zambezian Grasslands (no. 47 in Fig. 5.1); East African Halophytics (no. 50); and Eritrean Coastal Desert (no. 76)) had no dragonfly records and so were excluded, leaving 102 terrestrial and 78 freshwater ecoregions.

All records relative to the terrestrial and freshwater ecoregions are given in Appendices D1 and D2 respectively, and include: number of recorded species (species richness), number of recorded individuals (a rough surrogate for abundance, notwithstanding sampling effort), number of species documented for Red List threat statuses (LC – Least Concern, NT – Near Threatened, DD – Data Deficient, VU – Vulnerable, EN – Endangered, and CR – Critically Endangered), and number of species documented for the ADBI scores 0 – 9. In addition, the recorded species are shown as individualised species lists (i.e. species assemblages) for each of the 102 terrestrial (Appendix D3) and 78 freshwater (Appendix D4) ecoregions.

The data were analysed first by assigning the recorded number of species to the respective terrestrial and freshwater ecoregions. However, according to the biogeographical principle of the species-area relationship, larger areas hold more species (Rosenzweig 1995), the true geographical range extent of the species according to the respective ecoregions will not be accurate as each ecoregion has different area-sizes (km^2), for both sets of ecoregions. To circumvent this, the number of recorded species was adjusted for the area-size (km^2) of each ecoregion by calculating the species-area curves, as described by Rosenzweig (1995), for each ecoregion.

Next, non-metric multidimensional scaling (nMDS), in Primer 6 (PRIMER-E Ltd. 2008), was used to assess whether any patterns existed among the species' assemblages documented for the terrestrial and freshwater ecoregions (Clarke & Warwick 2001). To determine whether there were any significant differences in the assemblage structures among the terrestrial and freshwater ecoregions, a permutational multivariate analysis of variance (PERMANOVA) test were performed using PERMANOVA+ add-on in Primer 6 (PRIMER-E Ltd. 2008). Both nMDS and PERMANOVA were based on a Bray-Curtis similarity matrices derived from the square root transformed abundance data of the species recorded within the relevant ecoregions (Anderson 2001). The Pseudo F-Statistics and P-values of the PERMANOVA were estimated using 9999 permutations.

To determine the scattering of the ADBI scores (0 – 9), the density of the ADBI scores across the terrestrial and freshwater ecoregions were plotted. To test whether or not the distribution of these ADBI scores within the terrestrial and freshwater ecoregions were normally distributed, a

Kolmogorov-Smirnov (K-S) one-sample test for normality was used and applied on the total ADBI scores that were calculated for each ecoregion. The total ADBI scores for the respective ecoregions were calculated as follows: the number of species recorded for each ADBI scores (0 – 9), for each ecoregions, were multiplied by the relevant ADBI score (e.g. the freshwater ecoregion Cape Fold has 3 species with an ADBI score 8; thus: total ADBI 8 value = 3 x 8 = 24), and were then added together (of ADBI 0 – 9). Also, a non-parametric Spearman Rank Correlation ($-0.7 \leq r \leq 0.7$) was used on the total ADBI scores to determine how they compared across the terrestrial vs. freshwater ecoregions. The K-S test and Spearman Rank Correlation were undertaken using STATISTICA 13 (Dell Inc. 2016).

Lastly, the ecoregions were expressed, in terms of highest to lowest, the strongest average ADBI ecoregion-score, as well as the strongest average vulnerability-score of the species assemblages within the terrestrial and freshwater ecoregions. This was done by ranking the ecoregions according to the calculated average ADBI ecoregion-scores per ecoregion, as well as the calculated average vulnerability-score for each ecoregion. All maps were created using ArcGIS version 10.0 (ESRI 2010).

3. RESULTS

3.1 Range extent of the data: terrestrial and freshwater ecoregions

According to the area-adjusted number of recorded species, the African continent can be roughly separated into three overall geographical areas: 1) tropical areas, 2) sub-tropical areas, and 3) the desert and semi-desert areas of both northern and southern Africa (Fig. 5.3a and b). Not surprisingly, the tropical and sub-tropical areas of both sets of ecoregions (light and dark red) had, for the most part, high species richness, while the number of species per ecoregion (for both sets of ecoregions) decreased both northward and southward with the desertification gradient (light and dark blue) (Fig. 5.3a and b). In addition, some of the ecoregions that fall within the tropical areas, are regions that have not yet been well as explored in comparison with their more species rich neighbours (shaded light and dark blue).

For the terrestrial ecoregions, the highest area-adjusted species richness was 11-25 species per ecoregion (original recorded number: 86-265 species), while the lowest area-adjusted species richness was 0-6 species (original recorded number: 1-48 species) (Fig. 5.3a). For the freshwater ecoregions, the highest area-adjusted species richness was 14-26 species per ecoregion (original recorded number: 121-226 species), while the lowest area-adjusted species richness was 1-8 species (original recorded number: 1-74 species) (Fig. 5.3b). Within the highest area-adjusted species richness group, the

terrestrial ecoregions had three ecoregions with originally recorded species of >200: Central Zambezian Miombo Woodlands (265 species; no. 28 in Fig. 5.1), Western Congolian Forest-Savanna Mosaic (261 species; no. 46 in Fig. 5.1) and Northern Congolian Forest-Savanna Mosaic (207 species; no. 36 in Fig. 5.1). In turn, the freshwater ecoregions had only two ecoregions with >200 species: Lake Victoria Basin (211 species; no. 21 in Fig. 5.2) and Ogooue – Nyanga – Kouilou – Niari (226 species; no. 32 in Fig. 5.2).

For terrestrial ecoregions, there was a slight increase in the area-adjusted species richness for both the northern tip (i.e. Mediterranean Dry Woodlands and Steppe (no. 98), and Mediterranean Woodlands and Forests (no. 99) in Fig. 5.1) and southern tip (Lowland Fynbos and Renosterveld (no. 73), and Montane Fynbos and Renosterveld (no. 74) in Fig. 5.2) of the continent (light yellow; Fig. 5.3a). For freshwater ecoregions, there was only an increase in species at the southern tip of Africa (light yellow; Cape Fold, no. 78 in Fig. 5.2), with the most northern tip (i.e. Mediterranean Northwest Africa, no. 2 in Fig. 5.2) supporting fewer species (light blue; Fig. 5.3b) than its counterpart for the terrestrial ecoregions. Although both the northern and southern tips of Africa have a Mediterranean climate, this difference between the terrestrial and freshwater ecoregions could be due in part to the coarser scale of the freshwater ecoregions: 78 freshwater compared to 102 terrestrial ecoregions.

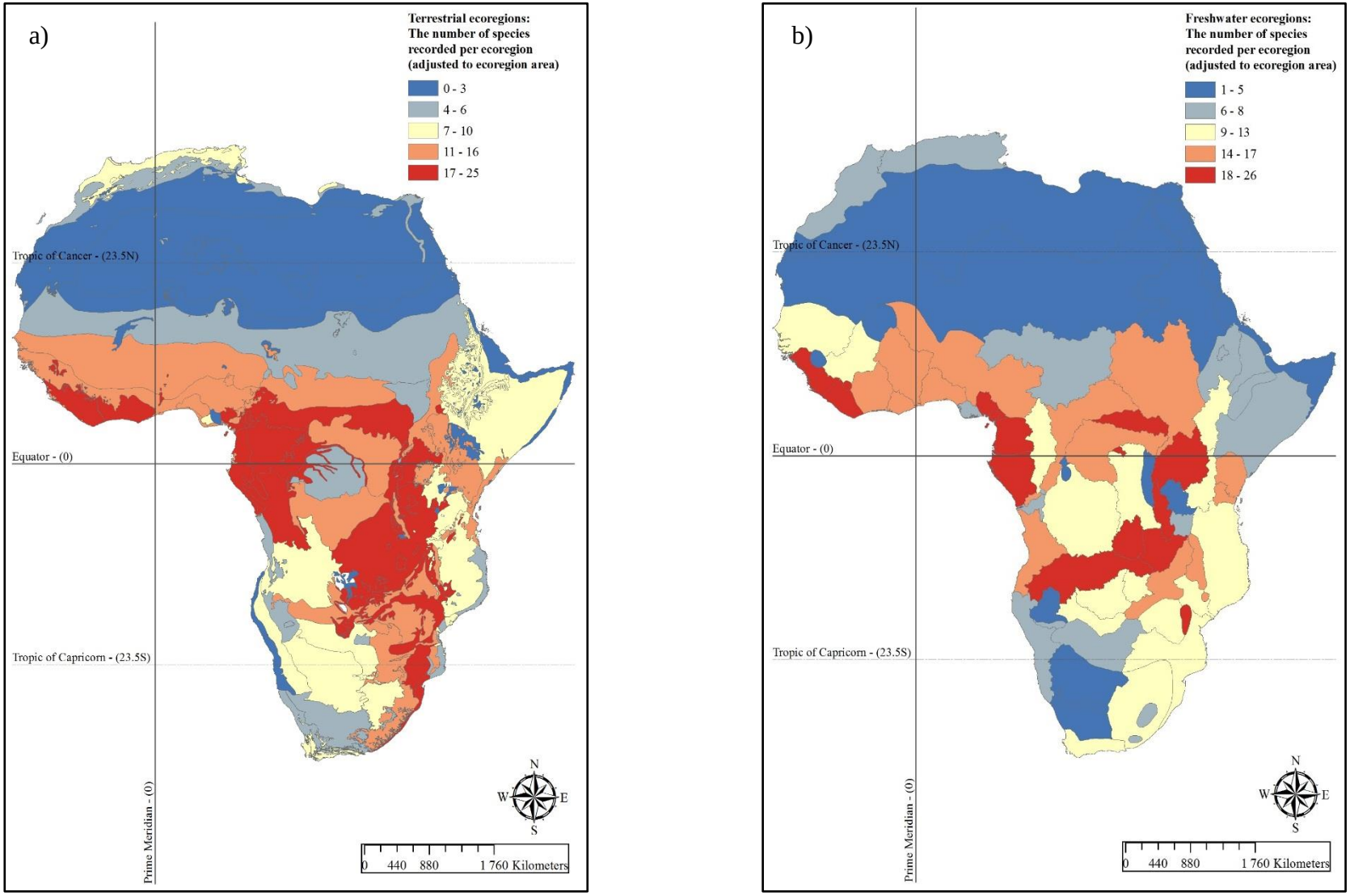


Figure 5.3. Illustrated here is the area-adjusted (km^2) species richness (i.e. recorded number of species per ecoregion) across the African continent according to: a) terrestrial ecoregions, and b) freshwater ecoregions. For both sets of ecoregions, the tropical and sub-tropical areas (light and dark red) have a high number of recorded species, while the desert and semi-desert areas (light and dark blue) have a low number.

3.2 Similarity between the species assemblages of the terrestrial and freshwater ecoregions

The non-metric multidimensional scaling (nMDS) shows an overlap in the species recorded in both terrestrial and freshwater ecoregions (Fig. 5.4). The few terrestrial ecoregions that did not overlap had <40 recorded individuals (Fig. 5.4 bottom, right, and left), and the four freshwater ecoregions that did not overlap had <55 recorded individuals (Fig. 5.4 on the right). Furthermore, the PERMANOVA shows no significant differences among the species assemblages for the two ecoregional approaches (Pseudo-F = 1.38, P = 0.13), suggesting similarity between the terrestrial and freshwater ecoregions in terms of species composition.

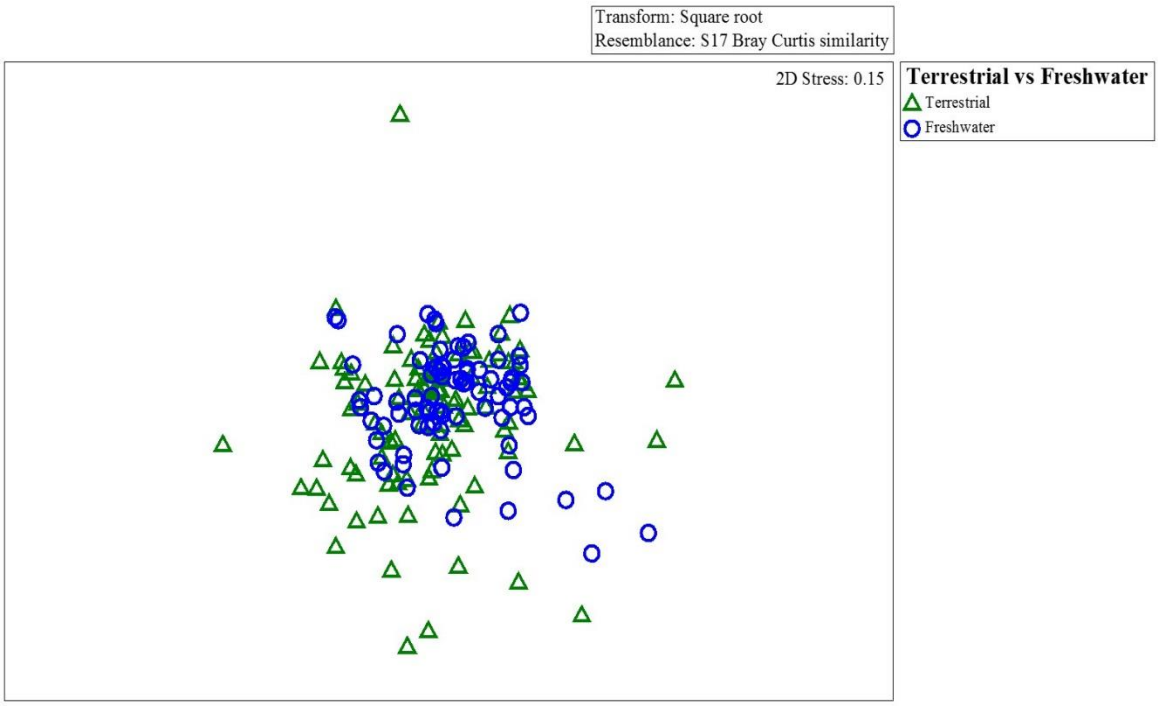


Figure 5.4. The non-metric multidimensional scaling (nMDS) diagram shows that there is similarity between dragonfly species documented for the terrestrial and freshwater ecoregions, based on Bray-Curtis similarity matrices derived from the square root transformed abundance data.

3.3 African Dragonfly Biotic Index (ADBI): terrestrial and freshwater ecoregions

Overall, the species fall into two main groups according to the ADBI score spectrum 0 – 9, i.e. generalists (ADBI scores 0 – 4: a combination of geographically widespread, non-threatened, and relatively less vulnerable to human disturbance) and specialists (ADBI scores 5 – 9: a combination of range-restricted, threatened, and vulnerable to human disturbance). When comparing the ADBI score plots (0 – 9) within terrestrial and freshwater ecoregions, for both sets of ecoregions, generalists occur over most of the continent (Fig. 5.5a and b). In contrast, the specialists are much more patchily spread and occur only in certain ecoregions, e.g. terrestrial ecoregion: Albany Thickets (no. 72 in Fig. 5.1), and freshwater ecoregion: Coastal East Africa (no. 64 in Fig. 5.2) (Fig. 5.5a and b). In the case of the terrestrial ecoregions, an average of 91% (93 of 102) ecoregions are occupied by generalists, while an average of 28% (29 of 102) ecoregions are occupied by specialists (Fig. 5.5a). For the freshwater ecoregions, an average of 97% (75 of 78) ecoregions are occupied by generalists, while an average of 32% (25 of 78) ecoregions are occupied by specialists (Fig. 5.5b).

According to the K-S one-sample test, the total ADBI scores of the terrestrial ecoregions have a non-normal data distribution at $p<.05$ (max D value = 0.14). On the other hand, the K-S one-sample test shows that the total ADBI scores of the freshwater ecoregions have a much more normal data distribution (max D value = 0.11, $p>.20$). Furthermore, according to the non-parametric Spearman Rank correlation ($-0.7 \leq r \leq 0.7$), the correlations of the total ADBI scores (in relation to the area-adjusted species richness) of both terrestrial and freshwater ecoregions are strongly significant at $p<.05$, i.e. the r-values are 0.92 for both sets of ecoregions. If the correlations of the individual ADBI scores are assessed, 79% (81 of 102) terrestrial ecoregions support significant correlations among the ADBI scores (0 – 9), while the 64% (50 of 78) freshwater ecoregions had significant correlations among the ADBI scores. Furthermore, the generalists species (ADBI scores 0 – 4) and a few specialists (ADBI 5) occurred across most of the terrestrial and freshwater ecoregions. However, the specialist species (ADBI scores 6 – 9) are better represented by terrestrial than freshwater ecoregions.

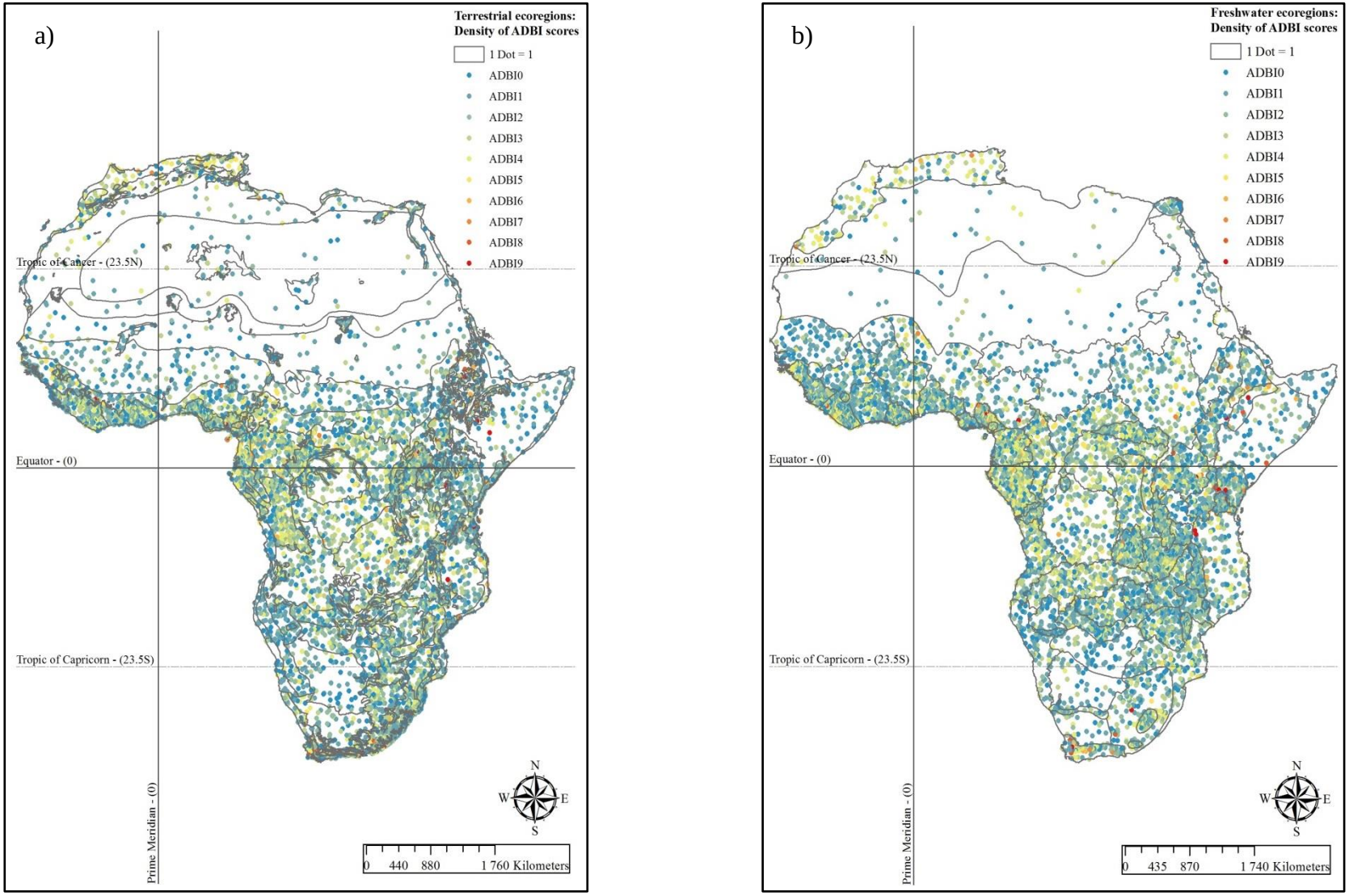


Figure 5.5. The visual density of the African Dragonfly Biotic Index (ADBI) scores (0 – 9) across the African continent according to: a) terrestrial ecoregions, and b) freshwater ecoregions. For the terrestrial ecoregions, an average of 93/102 ecoregions are occupied by species with ADBI scores 0 – 4, while for the freshwater ecoregions an average of 75/78 ecoregions are occupied by species with ADBI scores 0 – 4.

3.4 Ranking the terrestrial and freshwater ecoregions

3.4.1 African Dragonfly Biotic Index (ADBI)

As both terrestrial and freshwater ecoregions can represent species assemblages and subsequently ADBI scores 0 – 9, across the continent, it was necessary to determine which of the two sets of ecoregions better represented ADBI scores. This was done by calculating the average ADBI score per ecoregion, and then ranking the ecoregions from highest to lowest for both sets of ecoregions. This average ADBI ecoregion-score was calculated, first by determining the total ADBI score of each ecoregion and then dividing these numbers by the total number of species recorded for the relevant ecoregions. The total ADBI score was calculated as follows: the number of species recorded for each ADBI score (0 – 9) was multiplied by the relevant ADBI score (e.g. the freshwater ecoregion Cape Fold has 3 species with an ADBI score 8; thus: total ADBI 8 value = 3 x 8 = 24), and then added together (of ADBI 0 – 9).

3.4.1.1 Terrestrial ecoregions

The terrestrial ecoregions can be divided into four groups regarding their average ADBI ecoregion-scores, i.e. ecoregions with a very high ADBI ecoregion-score (≥3.0), those with a high ecoregion-score (<3.0, but ≥2.0), those with a moderate ecoregion-score (<2.0, but ≥1.0), and those with low ecoregion-scores (<1.0) (Table 5.3). Only three terrestrial ecoregions had a very high ecoregion-score of ≥3.0, namely Ethiopian Montane Moorlands (ADBI ecoregion-score = 4.25, no. 65 in Fig. 5.1), Mount Cameroon and Bioko Montane Forests (ADBI ecoregion-score = 3.55, no. 16 in Fig. 5.1), and Mediterranean Conifer and Mixed Forests (ADBI ecoregion-score = 3.04, no. 93 in Fig. 5.1) (Table 5.3). The species richness of these three terrestrial ecoregions was <55 species. Furthermore, only the Mediterranean Conifer and Mixed Forests had a close to a full set of ADBI scores (i.e. 0 – 9), although the other two did have a few specialists (ADBI scores 5 – 9).

A total of 27 terrestrial ecoregions had a high ADBI ecoregion-score (<3.0, but ≥2.0) (Table 5.3), including the three with >200 species, i.e. Central Zambezian Miombo Woodlands (ADBI ecoregion-score = 2.32, 265 species, no. 28 in Fig. 5.1), Western Congolian Forest-Savanna Mosaic (ADBI region-score = 2.46, 261 species, no. 46 in Fig. 5.1), and Northern Congolian Forest-Savanna Mosaic (ADBI region-score = 2.04, 207 species, no. 36 in Fig. 5.1). The species richness in these terrestrial ecoregions ranged from <10 to >200. Furthermore, these ecoregions with high average ADBI ecoregion-scores had both generalists and specialists. In general, there were more generalists than specialists, but these ecoregions had more specialists with ADBI scores 7 – 9 (Fig. 5.6) compared to other groups of ecoregions, as well as a nearly or a full set of ADBI scores (i.e. 0 – 9).

Just over half (57) of the 102 terrestrial ecoregions had a moderate ADBI ecoregion-score (<2.0, but ≥1.0), ranging from Zambezian and Mopane Woodlands (ADBI ecoregion-score = 1.98, no. 48 in Fig. 5.1) to Namib Desert (ADBI ecoregion-score = 1.04, no. 83 in Fig. 5.1) (Table 5.3). The species richness in these ecoregions ranged from <10 to <180. Although this group of ecoregions contained both generalists and specialists, there were few species with ADBI scores 5 – 6, and very few with ADBI scores 7 – 9 (Fig. 5.6). Furthermore, this group had no full sets or even close to full sets of ADBI scores as did the high ADBI ecoregion-score group.

Only 15 terrestrial ecoregions had low ADBI ecoregion-scores of <1.0 (Table 5.3), e.g. Guinean Mangroves (ADBI ecoregion-score = 0.95, no. 90 in Fig. 5.1), and Itigi-Sumbu Thicket (ADBI ecoregion-score = 0, no. 32 in Fig. 5.1). This group of ecoregions had only generalists (ADBI scores 0 – 4), with only one ecoregion containing one specialist species with an ADBI score 5 (Angolan Scarp Savanna and Woodlands, ADBI ecoregion-score = 0.97, no. 59 in Fig. 5.1). Also, these ecoregions were species poor (<100 species). Finally, none of these ecoregions in this group had a full set of ADBI scores.

Table 5.3. Ranking of the terrestrial ecoregions from highest to lowest, according to the calculated average African Dragonfly Biotic Index (ADBI) ecoregion-score as determined for each ecoregion. The total ADBI per ecoregion was divided by the total number of species recorded within the specific ecoregions. Number of species recorded for each of the ADBI scores (0 – 9), documented for specific relevant terrestrial ecoregions, are listed in Appendix D1.

Rank no.	Terrestrial ecoregion name	ADBI ecoregion-score	Rank no.	Terrestrial ecoregion name	ADBI ecoregion-score
1	Ethiopian Montane Moorlands	4.25	17	Central Zambezian Miombo Woodlands	2.32
2	Mount Cameroon and Bioko Montane Forests	3.55	18	East African Montane Moorlands	2.31
3	Mediterranean Conifer and Mixed Forests	3.04	19	Central Congolian Lowland Forests	2.31
4	Mediterranean High Atlas Juniper Steppe	2.83	20	Northeastern Congolian Lowland Forests	2.19
5	Mediterranean Woodlands and Forests	2.83	21	Eastern Congolian Swamp Forests	2.17
6	Montane Fynbos and Renosterveld	2.74	22	Albertine Rift Montane Forests	2.13
7	Cameroonian Highlands Forests	2.61	23	Albany Thickets	2.11
8	Lowland Fynbos and Renosterveld	2.60	24	Eastern Arc Forests	2.06
9	Cross-Sanaga-Bioko Coastal Forests	2.59	25	Victoria Basin Forest-Savanna Mosaic	2.06
10	Knysna-Amatole Montane Forests	2.58	26	Western Congolian Swamp Forests	2.06
11	Drakensberg Alti-Montane Grasslands and Woodlands	2.52	27	Western Guinean Lowland Forests	2.05
12	Western Congolian Forest-Savanna Mosaic	2.46	28	Northern Congolian Forest-Savanna Mosaic	2.04
13	Mediterranean Dry Woodlands and Steppe	2.42	29	Southern Zanzibar-Inhambane Coastal Forest Mosaic	2.02
14	Mediterranean Acacia-Argania Dry Woodlands and Succulent Thickets	2.42	30	Zambezian Cryptosepalum Dry Forests	2.00
15	Northwestern Congolian Lowland Forests	2.40	31	Zambezian and Mopane Woodlands	1.98
16	Atlantic Equatorial Coastal Forests	2.34	32	Southern Congolian Forest-Savanna Mosaic	1.98

Table 5.3. *Continued*.

Rank no.	Terrestrial ecoregion name	ADBI ecoregion-score	Rank no.	Terrestrial ecoregion name	ADBI ecoregion-score
33	Drakensberg Montane Grasslands, Woodlands and Forests	1.96	52	Central African Mangroves	1.69
34	Ethiopian Montane Forests	1.95	53	Zambezian Flooded Grasslands	1.68
35	Ethiopian Montane Grasslands and Woodlands	1.94	54	Eastern Miombo Woodlands	1.68
36	Guinean Montane Forests	1.93	55	Kwazulu-Cape Coastal Forest Mosaic	1.68
37	East African Montane Forests	1.91	56	Southern Africa Bushveld	1.67
38	Succulent Karoo	1.87	57	Highveld Grasslands	1.66
39	North Saharan Steppe and Woodlands	1.87	58	Nigerian Lowland Forests	1.63
40	Eastern Zimbabwe Montane Forest-Grassland Mosaic	1.86	59	Northern Zanzibar-Inhambane Coastal Forest Mosaic	1.63
41	Guinean Forest-Savanna Mosaic	1.85	60	Northern Acacia-Commiphora Bushlands and Thickets	1.60
42	Saharan Halophytics	1.85	61	Zambezian Baikiaea Woodlands	1.56
43	Eastern Guinean Forests	1.81	62	Southern Rift Montane Forest-Grassland Mosaic	1.55
44	Angolan Montane Forest-Grassland Mosaic	1.79	63	Cross-Niger Transition Forests	1.50
45	Southern Miombo Woodlands	1.78	64	Serengeti Volcanic Grasslands	1.50
46	Ruwenzori-Virunga Montane Moorlands	1.75	65	South Saharan Steppe and Woodlands	1.46
47	South Malawi Montane Forest-Grassland Mosaic	1.73	66	Niger Delta Swamp Forests	1.44
48	Angolan Miombo Woodlands	1.72	67	Zambezian Coastal Flooded Savanna	1.44
49	Maputaland-Pondoland Bushland and Thickets	1.71	68	Maputaland Coastal Forest Mosaic	1.42
50	Nama Karoo	1.70	69	East Sudanian Savanna	1.37
51	Lake: Afrotropic	1.69	70	Kalahari Acacia-Baikiaea Woodlands	1.35

Table 5.3. *Continued*.

Rank no.	Terrestrial ecoregion name	ADBI ecoregion-score	Rank no.	Terrestrial ecoregion name	ADBI ecoregion-score
71	West Sudanian Savanna	1.35	87	Ethiopian Xeric Grasslands and Shrublands	1.00
72	Somali Acacia-Commiphora Bushlands and Thickets	1.35	88	Angolan Scarp Savanna and Woodlands	0.97
73	Southern Acacia-Commiphora Bushlands and Thickets	1.34	89	East Saharan Montane Xeric Woodlands	0.95
74	Sahara Desert	1.30	90	Guinean Mangroves	0.95
75	Southern Africa Mangroves	1.29	91	Somali Montane Xeric Woodlands	0.89
76	Kalahari Xeric Savanna	1.28	92	Atlantic Coastal Desert	0.88
77	Jos Plateau Forest-Grassland Mosaic	1.19	93	Inner Niger Delta Flooded Savanna	0.83
78	Sahelian Acacia Savanna	1.18	94	Mandara Plateau Mosaic	0.80
79	West Saharan Montane Xeric Woodlands	1.16	95	Hobyo Grasslands and Shrublands	0.80
80	Namibian Savanna Woodlands	1.16	96	Zambezian Halophytics	0.78
81	Nile Delta Flooded Savanna	1.15	97	Kaokoveld Desert	0.77
82	Masai Xeric Grasslands and Shrublands	1.10	98	Red Sea Coastal Desert	0.75
83	East African Mangroves	1.07	99	Etosha Pan Halophytics	0.74
84	Namib Desert	1.04	100	Lake Chad Flooded Savanna	0.50
85	Saharan Flooded Grasslands	1.03	101	Tibesti-Jebel Uweinat Montane Xeric Woodlands	0.50
86	Angolan Mopane Woodlands	1.02	102	Itigi-Sumbu Thicket	0.00

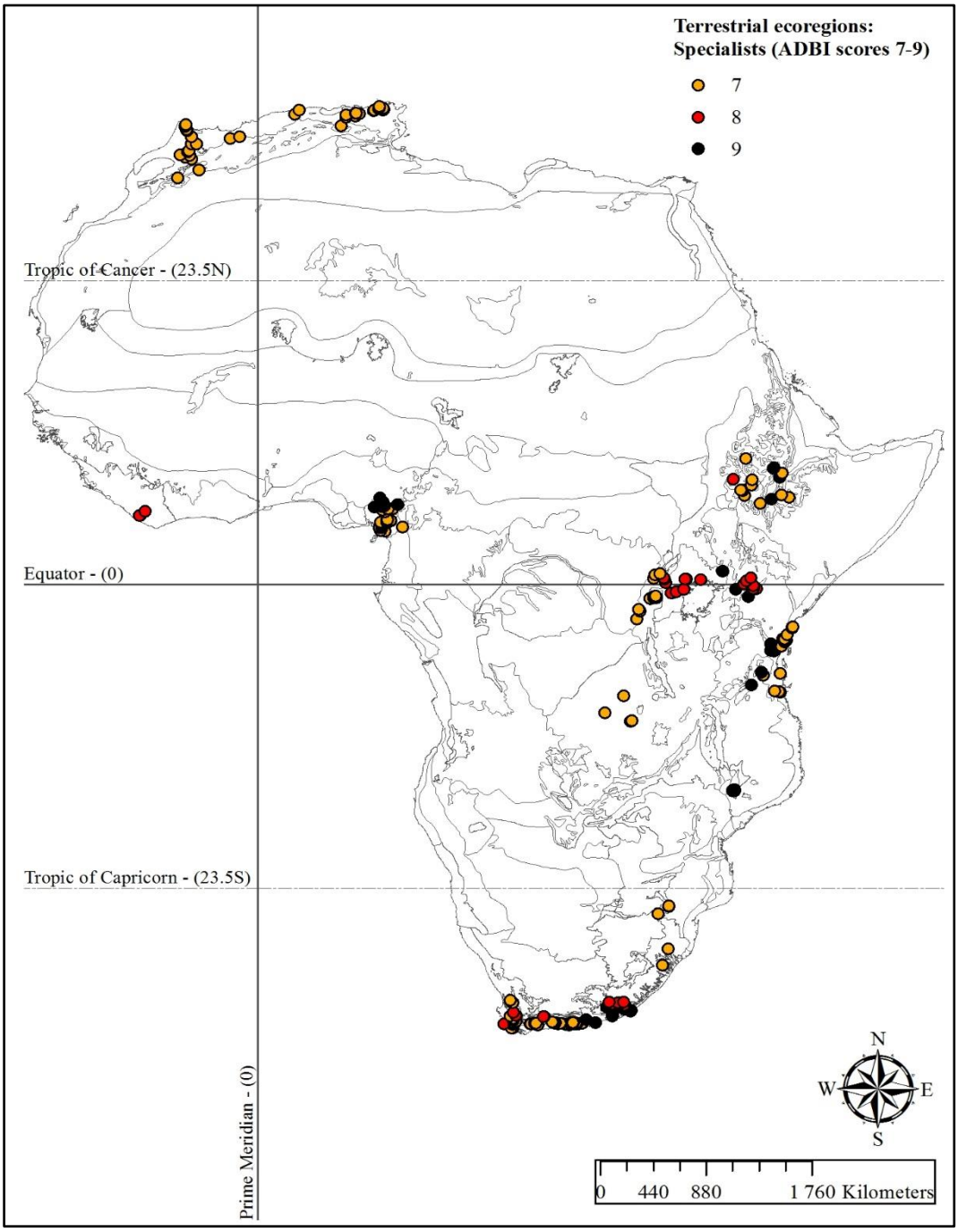


Figure 5.6. The terrestrial ecoregions supporting species with African Dragonfly Biotic Index (ADBI) scores 7 – 9, i.e. specialists. These ecoregions include: Montane Fynbos and Renosterveld (no. 74 in Fig. 5.1) to the south, Victoria Basin Forest-Savanna Mosaic (no. 44 in Fig. 5.1) to the east, Mediterranean Woodlands and Forests (no. 99 in Fig. 5.1) to the north, and Cross-Sanaga-Bioko Coastal Forests (no. 6 in Fig. 5.1) to the west.

3.4.1.2 Freshwater ecoregions

There were three groups of freshwater ecoregions in terms of their average ADBI ecoregion-scores: 1) those with a high ADBI ecoregion-score (≥2.0), 2) with a moderate ADBI ecoregion-score (<2.0, but ≥1.0), and 3) with a low ADBI ecoregion-score (<1.0) (Table 5.4). Unlike the terrestrial ecoregions, the freshwater ecoregions did not have an ecoregion group that had very high ADBI ecoregion-scores (i.e. ≥3.0). There were 22 freshwater ecoregions with a high ADBI ecoregion-score (≥2.0), e.g. Mediterranean Northwest Africa (ADBI ecoregion-score = 2.76, no. 2 in Fig. 5.2), Cape Fold (ADBI ecoregion-score = 2.59, no. 78 in Fig. 5.2), and Cuanza (ADBI ecoregion-score = 2.01, no. 51 in Fig. 5.2) (Table 5.4). The species richness in these ecoregions ranged from <100 to >200, including the two ecoregions with the highest recorded species richness: Lake Victoria Basin (ADBI ecoregion-score = 2.04, 211 species, no. 21 in Fig. 5.2), and Ogooue – Nyanga – Kouilou – Niari (ADBI ecoregion-score = 2.45, 226 species, no. 32 in Fig. 5.2) (Table 5.4). Furthermore, ecoregions with high ADBI ecoregion-scores supported more generalists than specialists, yet many of the specialists had high ADBI scores 7 – 9 (Fig. 5.7). However, this group did not have many, near to, or full sets of ADBI scores (i.e. 0 – 9).

Like the terrestrial ecoregions, most (49) of the 78 freshwater ecoregions had a moderate ADBI ecoregion-score of <2.0, but ≥1.0, spanning from Pangani (ADBI ecoregion-score = 1.99, no. 68 in Fig. 5.2) to Lake Chad (ADBI ecoregion-score = 1.05, no. 20 in Fig. 5.2) (Table 5.4). Furthermore, species richness in these ecoregions ranged from <10 to <200 species. This group also had both generalists and specialists, although they had fewer species with ADBI scores 5 – 6 than the group with high ADBI ecoregions-scores. However, this group had the same number of specialists with ADBI scores 7 – 9 as the group with high ADBI ecoregion-scores (Table 5.4; Fig. 5.7). Furthermore, this group had more near to, or full, sets of ADBI scores than the other two groups of freshwater ecoregions. Finally, only seven freshwater ecoregions had a low ADBI ecoregion-score (<1.0), e.g. Kalahari (ADBI ecoregion-score = 0.98, no. 70 in Fig. 5.2), and Malagarasi – Moyowosi (ADBI ecoregion-score = 0.68, no. 43 in Fig. 5.2) (Table 5.4). The low ADBI ecoregion-score group consisted mainly of generalists (ADBI 0 – 4), but two of the ecoregions each had one species with an ADBI score of 5. Furthermore, these ecoregions had <100 recorded number of species.

Table 5.4. Freshwater ecoregions, ranked from highest to lowest, according to the calculated average African Dragonfly Biotic Index (ADBI) ecoregion-score as determined for each ecoregion. The total ADBI per ecoregion was divided by the total number of species recorded within the specific ecoregions. The number of species recorded for each of the ADBI scores (0 – 9), documented for specific freshwater ecoregions, are listed in Appendix D2.

Rank no.	Freshwater ecoregion name	ADBI ecoregion-score	Rank no.	Freshwater ecoregion name	ADBI ecoregion-score
1	Mediterranean Northwest Africa	2.76	19	Bangweulu – Mweru	2.03
2	Atlantic Northwest Africa	2.75	20	Kasai	2.03
3	Western Equatorial Crater Lakes	2.64	21	Southern Upper Guinea	2.03
4	Cape Fold	2.59	22	Cuanza	2.01
5	Northern Gulf of Guinea Drainages	2.57	23	Pangani	1.99
6	Ogooue – Nyanga – Kouilou – Niari	2.45	24	Uele	1.99
7	Southern Gulf of Guinea Drainages – Bioko	2.38	25	Upper Lualaba	1.97
8	Albertine Highlands	2.31	26	Coastal East Africa	1.96
9	Mount Nimba	2.27	27	Lake Tanganyika	1.95
10	Amatolo – Winterberg Highlands	2.26	28	Northern Upper Guinea	1.94
11	Drakensberg – Maloti Highlands	2.25	29	Southern Temperate Highveld	1.91
12	Cuvette Centrale	2.21	30	Ethiopian Highlands	1.89
13	Sangha	2.20	31	Sahara	1.89
14	Zambezian Headwaters	2.15	32	Mulanje	1.86
15	Upper Congo Rapids	2.12	33	Lower Niger – Benue	1.85
16	Lake Victoria Basin	2.04	34	Eastern Zimbabwe Highlands	1.85
17	Sudanic Congo – Oubangi	2.04	35	Tana, Athi & Coastal Drainages	1.84
18	Upper Congo	2.04	36	Lower Congo Rapids	1.84

Table 5.4. *Continued*.

Rank no.	Freshwater ecoregion name	ADBI ecoregion-score	Rank no.	Freshwater ecoregion name	ADBI ecoregion-score
37	Tumba	1.83	58	Western Orange	1.44
38	Northern Eastern Rift	1.81	59	Niger Delta	1.41
39	Zambezian Lowveld	1.79	60	Shebelle – Juba	1.41
40	Upper Nile	1.78	61	Lower Zambezi	1.35
41	Ashanti	1.78	62	Malebo Pool	1.30
42	Lake Turkana	1.76	63	Upper Niger	1.29
43	Lower Congo	1.75	64	Fouta – Djalon	1.29
44	Lake Malawi	1.74	65	Kafue	1.26
45	Middle Zambezi – Luangwa	1.69	66	Dry Sahel	1.21
46	Bight Drainages	1.63	67	Southern Kalahari	1.21
47	Mai Ndombe	1.63	68	Nile Delta	1.19
48	Okavango	1.58	69	Namib	1.18
49	Volta	1.57	70	Lower Nile	1.15
50	Upper Zambezi Floodplains	1.56	71	Lake Chad	1.05
51	Karoo	1.55	72	Kalahari	0.98
52	Zambezian Highveld	1.54	73	Karstveld Sink Holes	0.98
53	Southern Eastern Rift	1.53	74	Horn of Africa	0.92
54	Lake Tana	1.48	75	Senegal – Gambia	0.89
55	Western Red Sea Drainages	1.48	76	Etosha	0.89
56	Eburneo	1.46	77	Inner Niger Delta	0.79
57	Lake Rukwa	1.44	78	Malagarasi – Moyowosi	0.68

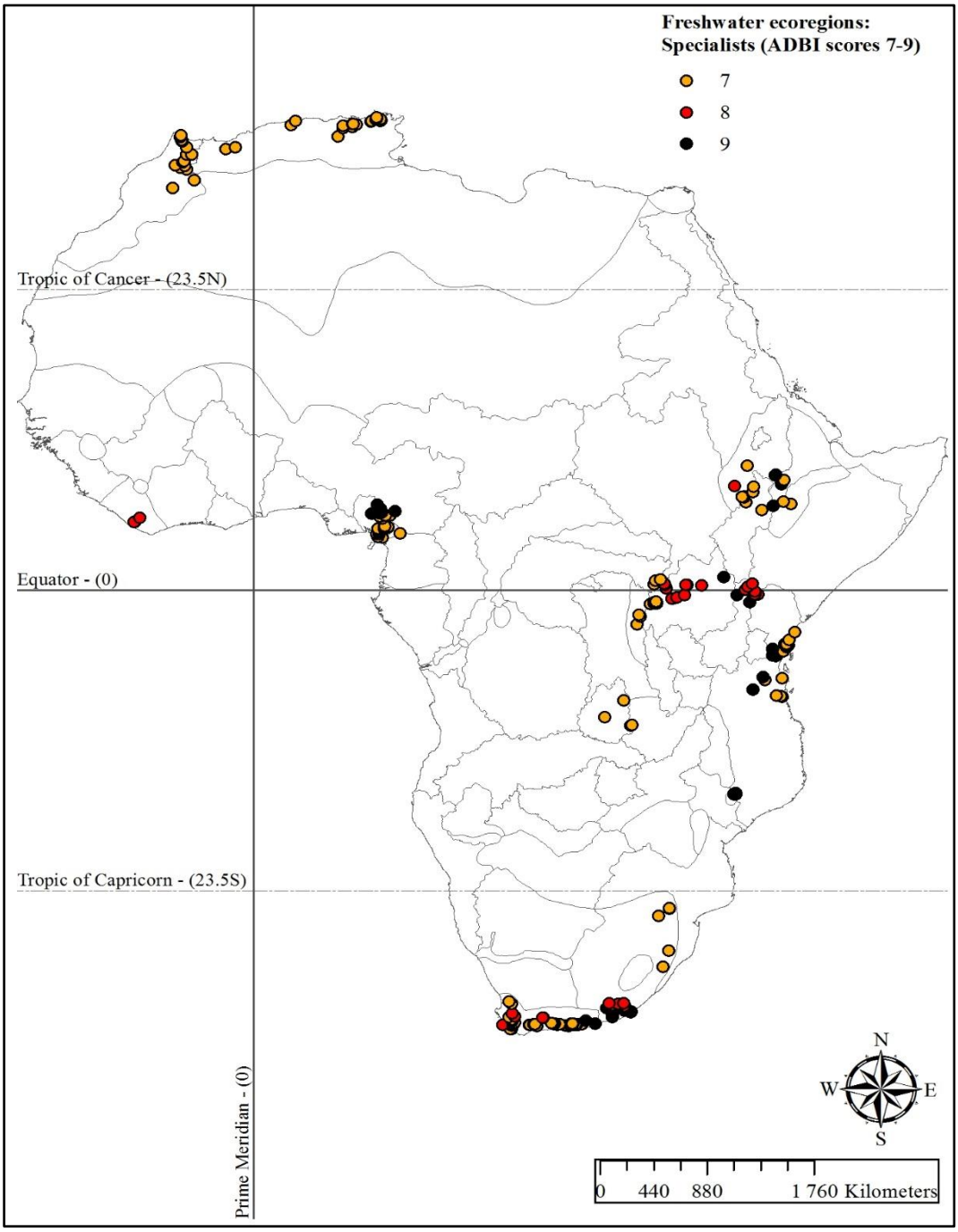


Figure 5.7. Freshwater ecoregions supporting species with African Dragonfly Biotic Index (ADBI) scores 7 – 9, i.e. specialists. These ecoregions include: Cape Fold (no. 78 in Fig. 5.2) to the south, Lake Victoria Basin (no. 21 in Fig. 5.2) to the east, Mediterranean Northwest Africa (no. 2 in Fig. 5.2) to the north, and Northern Gulf of Guinea Drainages (no. 18 in Fig. 5.2) to the west.

3.4.2 Red List threat status

Similar to the ADBI scores, the global IUCN/SSC Red List threat statuses that were appointed to each dragonfly species (IUCN 2016), also have some bearing on the level of threat these species face at a regional scale. Thus, both terrestrial and freshwater ecoregions can also be ranked according to the level of threat facing these species, calculated here by using the average vulnerability of each ecoregion, and then ranking the ecoregions from highest to lowest for both sets of ecoregions. The average ecoregion vulnerability-score was calculated by first, assigning each IUCN/SSC threat status (IUCN 2016: Least Concern – LC, Near Threatened – NT, Vulnerable – VU, Endangered – EN, and Critically Endangered – CR) with a score, while ignoring the status 'Data Deficient' (DD), i.e. LC = 0, NT = 1, VU = 2, EN = 3, and CR = 4. Secondly, the number of species recorded for each of these Red List threat statuses was multiplied by the assigned score. The number of recorded species for each Red List threat status, for the terrestrial and freshwater ecoregions, are listed in Appendices D1 and D2 respectively. Thirdly, the total vulnerability was calculated by adding together the above multiplied values of these Red List threat statuses (LC to CR). Finally, to determine the average ecoregion vulnerability-score, the total vulnerability of each ecoregion was divided by the total number of species documented for the relevant ecoregion.

3.4.2.1 Terrestrial ecoregions

The terrestrial ecoregions can be divided into three groups regarding their average ecoregion vulnerability-scores, i.e. 1) those with a high vulnerability-score (≥0.10), 2) those with a moderate vulnerability-score (<0.10, but ≥0.01), and 3) ecoregions with a low vulnerability-score (= 0) (Table 5.5). The first 18 ecoregions had a high vulnerability-score (≥0.10), with Ethiopian Montane Moorlands (no. 65 in Fig. 5.1) having the highest vulnerability-score at 0.75 (Table 5.5). This group of ecoregions has a wide range of high vulnerability statuses, with 1 to 4 species recorded for the threat statuses NT, VU, EN, and CR (LC not applicable as it is multiplied by zero). Furthermore, some of these ecoregions had a full range of vulnerability statuses (from NT to CR), e.g. Eastern Arc Forests (vulnerability score = 0.14, no. 8 in Fig. 5.1) (Table 5.5). Of these 18 ecoregions, 10 of them also had very high (≥3.0) to high (<3.0, but ≥2.0) ADBI ecoregion-scores, including Ethiopian Montane Moorlands (as above), Mount Cameroon and Bioko Montane Forests (vulnerability-score = 0.10, no. 16 in Fig. 5.1), Mediterranean Conifer and Mixed Forests (vulnerability-score = 0.15, no. 93 in Fig. 5.1), Lowland Fynbos and Renosterveld (vulnerability-score = 0.29, no. 73 in Fig. 5.1), and Knysna-Amatole Montane Forests (vulnerability-score = 0.21, no. 13 in Fig. 5.1) (Table 5.5).

A total of 37 terrestrial ecoregions had a moderate vulnerability-score (<0.10, but ≥0.01), e.g. Albertine Rift Montane Forests (vulnerability-score = 0.06, no. 1 in Fig. 5.1), and East Sudanian Savanna (vulnerability-score = 0.01, no. 29 in Fig. 5.1) (Table 5.5). This group of ecoregions had

mostly species classified as NT, with few (14) as VU and EN, and very few (6) as CR. Also, this group of ecoregions had only two ecoregions that had a full range of vulnerability statuses (from NT to CR) of which both have a vulnerability-score of 0.08, i.e. Cross-Sanaga-Bioko Coastal Forests (no. 6 in Fig. 5.1) and Victoria Basin Forest-Savanna Mosaic (no. 44 in Fig. 5.1) (Table 5.5). In addition, nearly half (18) of these 37 ecoregions had high (<3.0, but ≥2.0) to moderate (<2.0, but ≥1.0) ADBI ecoregion-scores, such as Southern Miombo Woodlands (vulnerability-score = 0.03, no. 43 in Fig. 5.1) and Southern Congolian Forest-Savanna Mosaic (vulnerability-score = 0.01, no. 42 in Fig. 5.1) (Table 5.5).

Finally, most of the terrestrial ecoregions (47) had a low average vulnerability-score (= 0), e.g. Cross-Niger Transition Forests (no. 5 in Fig. 5.1), Highveld Grasslands (no. 66 in Fig. 5.1), and Sahara Desert (no. 102 in Fig. 5.1) (Table 5.5). This means that all the species recorded within these ecoregions were classified as of LC, and have no species with high vulnerability statuses (NT – CR). Furthermore, 34 of the 47 ecoregions had a moderate (<2.0, but ≥1.0) to low (<1.0) ADBI ecoregion-score, which is more than the other two terrestrial groups, e.g. Nigerian Lowland Forests (no. 18 in Fig. 5.1), Red Sea Coastal Desert (no. 85 in Fig. 5.1), and Atlantic Coastal Desert (no. 100 in Fig. 5.1).

Table 5.5. Ranking the terrestrial ecoregions, from highest to lowest, according to the calculated average ecoregion vulnerability-score. This was accomplished by calculating the total vulnerability of each ecoregion divided by the total number of species recorded within the relevant ecoregion. Excluded from these calculations are the threat status 'Data Deficient' (DD). The number of species documented for the IUCN/SSC Red List threat statuses (LC, NT, DD, VU, EN, and CR) that were recorded for the relevant terrestrial ecoregions are listed in Appendix D1.

Rank no.	Terrestrial ecoregion name	Vulnerability-score	Rank no.	Terrestrial ecoregion name	Vulnerability-score
1	Ethiopian Montane Moorlands	0.75	15	Eastern Miombo Woodlands	0.11
2	Montane Fynbos and Renosterveld	0.37	16	Southern Zanzibar-Inhambane Coastal Forest Mosaic	0.11
3	Lowland Fynbos and Renosterveld	0.29	17	Drakensberg Montane Grasslands, Woodlands and Forests	0.10
4	Ethiopian Montane Grasslands and Woodlands	0.24	18	Mount Cameroon and Bioko Montane Forests	0.10
5	Ethiopian Montane Forests	0.23	19	Somali Acacia-Commiphora Bushlands and Thickets	0.08
6	Knysna-Amatole Montane Forests	0.21	20	Cross-Sanaga-Bioko Coastal Forests	0.08
7	East African Montane Moorlands	0.15	21	Victoria Basin Forest-Savanna Mosaic	0.08
8	Mediterranean Conifer and Mixed Forests	0.15	22	South Saharan Steppe and Woodlands	0.08
9	Eastern Arc Forests	0.14	23	Northern Zanzibar-Inhambane Coastal Forest Mosaic	0.07
10	Albany Thickets	0.14	24	South Malawi Montane Forest-Grassland Mosaic	0.07
11	East African Montane Forests	0.13	25	Angolan Scarp Savanna and Woodlands	0.07
12	Mediterranean Woodlands and Forests	0.13	26	Albertine Rift Montane Forests	0.06
13	Cameroonian Highlands Forests	0.12	27	Northern Acacia-Commiphora Bushlands and Thickets	0.05
14	Mediterranean Dry Woodlands and Steppe	0.12	28	West Saharan Montane Xeric Woodlands	0.05

Table 5.5. *Continued*.

Rank no.	Terrestrial ecoregion name	Vulnerability-score	Rank no.	Terrestrial ecoregion name	Vulnerability-score
29	East African Mangroves	0.05	49	Sahelian Acacia Savanna	0.01
30	Eastern Zimbabwe Montane Forest-Grassland Mosaic	0.05	50	Atlantic Equatorial Coastal Forests	0.01
31	Central Zambezian Miombo Woodlands	0.04	51	Southern Acacia-Commiphora Bushlands and Thickets	0.01
32	Zambezian Baikiaea Woodlands	0.04	52	Southern Congolian Forest-Savanna Mosaic	0.01
33	Guinean Forest-Savanna Mosaic	0.03	53	Southern Africa Bushveld	0.01
34	Maputaland-Pondoland Bushland and Thickets	0.03	54	East Sudanian Savanna	0.01
35	Kwazulu-Cape Coastal Forest Mosaic	0.03	55	Northeastern Congolian Lowland Forests	0.01
36	Angolan Montane Forest-Grassland Mosaic	0.03	56	Central Congolian Lowland Forests	0.00
37	Zambezian and Mopane Woodlands	0.03	57	Cross-Niger Transition Forests	0.00
38	Southern Miombo Woodlands	0.03	58	Eastern Congolian Swamp Forests	0.00
39	Angolan Miombo Woodlands	0.03	59	Eastern Guinean Forests	0.00
40	North Saharan Steppe and Woodlands	0.03	60	Guinean Montane Forests	0.00
41	Succulent Karoo	0.03	61	Maputaland Coastal Forest Mosaic	0.00
42	Lake: Afrotropic	0.02	62	Niger Delta Swamp Forests	0.00
43	Mediterranean Acacia-Argania Dry Woodlands and Succulent Thickets	0.02	63	Nigerian Lowland Forests	0.00
44	Western Guinean Lowland Forests	0.02	64	Western Congolian Swamp Forests	0.00
45	Zambezian Flooded Grasslands	0.02	65	Zambezian Cryptosepalum Dry Forests	0.00
46	Western Congolian Forest-Savanna Mosaic	0.02	66	Angolan Mopane Woodlands	0.00
47	Northwestern Congolian Lowland Forests	0.02	67	Itigi-Sumbu Thicket	0.00
48	Namibian Savanna Woodlands	0.01	68	Kalahari Acacia-Baikiaea Woodlands	0.00

Table 5.5. *Continued*.

Rank no.	Terrestrial ecoregion name	Vulnerability-score	Rank no.	Terrestrial ecoregion name	Vulnerability-score
69	Mandara Plateau Mosaic	0.00	86	Hobyo Grasslands and Shrublands	0.00
70	Northern Congolian Forest-Savanna Mosaic	0.00	87	Kalahari Xeric Savanna	0.00
71	Serengeti Volcanic Grasslands	0.00	88	Kaokoveld Desert	0.00
72	West Sudanian Savanna	0.00	89	Masai Xeric Grasslands and Shrublands	0.00
73	Etosha Pan Halophytics	0.00	90	Nama Karoo	0.00
74	Inner Niger Delta Flooded Savanna	0.00	91	Namib Desert	0.00
75	Lake Chad Flooded Savanna	0.00	92	Red Sea Coastal Desert	0.00
76	Saharan Flooded Grasslands	0.00	93	Somali Montane Xeric Woodlands	0.00
77	Zambezian Coastal Flooded Savanna	0.00	94	Central African Mangroves	0.00
78	Zambezian Halophytics	0.00	95	Guinean Mangroves	0.00
79	Drakensberg Alti-Montane Grasslands and Woodlands	0.00	96	Southern Africa Mangroves	0.00
80	Highveld Grasslands	0.00	97	Nile Delta Flooded Savanna	0.00
81	Jos Plateau Forest-Grassland Mosaic	0.00	98	Saharan Halophytics	0.00
82	Ruwenzori-Virunga Montane Moorlands	0.00	99	Mediterranean High Atlas Juniper Steppe	0.00
83	Southern Rift Montane Forest-Grassland Mosaic	0.00	100	Atlantic Coastal Desert	0.00
84	East Saharan Montane Xeric Woodlands	0.00	101	Sahara Desert	0.00
85	Ethiopian Xeric Grasslands and Shrublands	0.00	102	Tibesti-Jebel Uweinat Montane Xeric Woodlands	0.00

3.4.2.2 Freshwater ecoregions

Like the terrestrial ecoregions, the freshwater ecoregions can also be divided into three groups regarding their average ecoregion vulnerability-scores, i.e. 1) those with a high vulnerability-score (≥0.10), 2) those with a moderate vulnerability-score (<0.10, but ≥0.01), and 3) those with a low vulnerability-score (= 0) (Table 5.6). Only 11 of the freshwater ecoregions had a high vulnerability-score of ≥0.10, e.g. Cape Fold (vulnerability-score = 0.33, no. 78 in Fig. 5.2), Pangani (vulnerability-score = 0.16, no. 68 in Fig. 5.2), and Atlantic Northwest Africa (vulnerability-score = 0.10, no. 1 in Fig. 5.2) (Table 5.6). Like the first group of the terrestrial ecoregions, this group of ecoregions also had a wide range of high vulnerability statuses, with 1 to 4 species recorded for the threat statuses NT, VU, EN, and CR (LC is not applicable as its multiplied value is zero). Also, some of these ecoregions had a full range of vulnerability statuses (NT – CR), such as Coastal East Africa (vulnerability-score = 0.11, no. 64 in Fig. 5.2). However, unlike the terrestrial ecoregions, very few of these freshwater ecoregions (4) had a high ADBI ecoregion-score (≥2.0), e.g. Mediterranean Northwest Africa (vulnerability-score = 0.13, no. 2 in Fig. 5.2) and Northern Gulf of Guinea Drainages (vulnerability-score = 0.10, no. 18 in Fig. 5.2).

A total of 31 of the freshwater ecoregions had a moderate vulnerability-score (<0.10, but ≥0.01), ranging from Mulanje (vulnerability-score = 0.09, no. 62 in Fig. 5.2) to the Upper Nile (vulnerability-score = 0.01, no. 22 in Fig. 5.2) (Table 5.6). Similar to the terrestrial ecoregions, this group of freshwater ecoregions had mostly species classified as NT, with few (12) as VU, and very few (7) as EN or CR. Only one of this group of ecoregions had a full range of vulnerability statuses (NT – CR), i.e. Lake Victoria Basin (vulnerability-score = 0.07, no. 21 in Fig. 5.2). Moreover, nearly half of these ecoregions (15) had a high (≥2.0) to a moderate (<2.0, but ≥1.0) ADBI ecoregion-score, e.g. Southern Temperate Highveld (vulnerability-score = 0.08, no. 75 in Fig. 5.2), Sahara (vulnerability-score = 0.03, no. 3 in Fig. 5.2), and Lake Tanganyika (vulnerability-score = 0.01, no. 42 in Fig. 5.2).

Nearly half (36) of the freshwater ecoregions had a low vulnerability-score of 0.00, e.g. Niger Delta (no. 6 in Fig. 5.2), Upper Congo (no. 40 in Fig. 5.2), Kalahari (no. 70 in Fig. 5.2), and Karoo (no. 73 in Fig. 5.2) (Table 5.6). Like the terrestrial ecoregions, this group of freshwater ecoregions only supported species that were LC, indicating that none of these ecoregions is currently vulnerable. Furthermore, also like the terrestrial ecoregions, more than half of this group of freshwater ecoregions (25 of 36) had a moderate (<2.0, but ≥1.0) to low (<1.0) ADBI ecoregion-score, such as Inner Niger Delta (no. 8 in Fig. 5.2), Karstveld Sink Holes (no. 54 in Fig. 5.2), and Karoo (no. 73 in Fig. 5.2).

3.4.2.3 Correlations

As there was no clear distinction between the average ecoregions vulnerability-scores of the terrestrial vs. freshwater ecoregions, a non-parametric Spearman Rank correlation ($-0.7 \leq r \leq 0.7$) was used to determine which of these two ecoregion sets was better at drawing attention to the vulnerability of the species, and so to the regions. When the average vulnerability-scores of the 102 terrestrial ecoregions were compared with the average vulnerability-scores of the 78 freshwater ecoregions, there was strong correlation ($r = 0.96$, $p<.05$, for 78 randomly selected terrestrial ecoregions). This means that there was no significant difference between the average vulnerability-scores of the terrestrial vs. freshwater ecoregions. Thus, both the terrestrial and freshwater ecoregions can be used to assess the vulnerability of freshwater ecosystems at a continental biogeographical scale.

Table 5.6. Ranking the freshwater ecoregions, from highest to lowest, according to the ecoregion vulnerability-score. The total vulnerability of each ecoregion was divided by the total number of species recorded within specific ecoregions. Excluded from these calculations are the vulnerability category 'Data Deficient' (DD). Number of species documented for the IUCN/SSC Red List statuses (LC, NT, VU, EN, and CR) that were recorded for the relevant freshwater ecoregions are listed in Appendix D2.

Rank no.	Freshwater ecoregion name	Vulnerability-score	Rank no.	Freshwater ecoregion name	Vulnerability-score
1	Cape Fold	0.33	19	Drakensberg – Maloti Highlands	0.04
2	Ethiopian Highlands	0.23	20	Western Red Sea Drainages	0.04
3	Lake Turkana	0.18	21	Lower Nile	0.04
4	Pangani	0.16	22	Southern Eastern Rift	0.04
5	Northern Eastern Rift	0.14	23	Upper Zambezi Floodplains	0.04
6	Tana, Athi & Coastal Drainages	0.13	24	Lower Niger – Benue	0.04
7	Mediterranean Northwest Africa	0.13	25	Bangweulu – Mweru	0.03
8	Coastal East Africa	0.11	26	Dry Sahel	0.03
9	Lake Tana	0.10	27	Okavango	0.03
10	Northern Gulf of Guinea Drainages	0.10	28	Lake Malawi	0.03
11	Atlantic Northwest Africa	0.10	29	Sahara	0.03
12	Mulanje	0.09	30	Upper Lualaba	0.02
13	Western Equatorial Crater Lakes	0.08	31	Southern Upper Guinea	0.02
14	Shebelle – Juba	0.08	32	Southern Gulf of Guinea Drainages – Bioko	0.02
15	Southern Temperate Highveld	0.08	33	Namib	0.01
16	Lake Victoria Basin	0.07	34	Cuanza	0.01
17	Albertine Highlands	0.05	35	Mount Nimba	0.01
18	Eastern Zimbabwe Highlands	0.04	36	Zambezian Headwaters	0.01

Table 5.6. *Continued*.

Rank no.	Freshwater ecoregion name	Vulnerability-score	Rank no.	Freshwater ecoregion name	Vulnerability-score
37	Ogooue – Nyanga – Kouilou – Niari	0.01	58	Cuvette Centrale	0.00
38	Sangha	0.01	59	Tumba	0.00
39	Kasai	0.01	60	Upper Congo Rapids	0.00
40	Middle Zambezi – Luangwa	0.01	61	Upper Congo	0.00
41	Lake Tanganyika	0.01	62	Malagarasi – Moyowosi	0.00
42	Upper Nile	0.01	63	Mai Ndombe	0.00
43	Niger Delta	0.00	64	Malebo Pool	0.00
44	Upper Niger	0.00	65	Lower Congo Rapids	0.00
45	Inner Niger Delta	0.00	66	Lower Congo	0.00
46	Senegal – Gambia	0.00	67	Etosha	0.00
47	Fouta – Djalon	0.00	68	Karstveld Sink Holes	0.00
48	Northern Upper Guinea	0.00	69	Kafue	0.00
49	Eburneo	0.00	70	Zambezian Highveld	0.00
50	Ashanti	0.00	71	Lower Zambezi	0.00
51	Volta	0.00	72	Lake Rukwa	0.00
52	Bight Drainages	0.00	73	Kalahari	0.00
53	Lake Chad	0.00	74	Southern Kalahari	0.00
54	Nile Delta	0.00	75	Western Orange	0.00
55	Horn of Africa	0.00	76	Karoo	0.00
56	Sudanic Congo – Oubangi	0.00	77	Zambezian Lowveld	0.00
57	Uele	0.00	78	Amatolo – Winterberg Highlands	0.00

4. DISCUSSION

Results show great similarity between the dragonfly species assemblages for the terrestrial and freshwater ecoregions. Also, both these two ecoregion sets showed a strong significant correlation between the total ADBI scores and species recorded within their borders. Thus, the null hypothesis, both the terrestrial and freshwater ecoregions have equal value according to the species composition and therefore, the recorded ADBI scores (0 – 9), is accepted. Therefore, this means that when assessing the health and diversity of freshwater ecosystems from a continental perspective, the two approaches, terrestrial or freshwater ecoregions, have equal value. Below each of these ecoregions, in terms of their classification, are discussed.

4.1. Terrestrial ecoregions

The terrestrial ecoregions, as described by Olson *et al.* (2001), were delineated according to the habitat classifications that fall within the 14 biomes that represent the world. The vegetation compositions of these habitats are an important indicator of the presence of insects, as different insects associate with different vegetation communities (Panzer & Schwartz 1998; Wright & Samways 1998; Olsen *et al.* 2001). This is the same with the presence of dragonflies, as dragonflies are related to specific vegetation communities, i.e. forested landscapes will have different dragonfly species than a savanna landscape (Samways & Simaika 2016). Thus, terrestrial ecoregions are best at describing dragonfly species assemblages (e.g. Clausnitzer *et al.* 2009).

This means that terrestrial ecoregions are preferable over freshwater ones, despite dragonflies being predominately freshwater organisms. The ecological reason behind this is that these insects, as with many other freshwater invertebrates, often have highly specific habitat requirements. This means that they are often associated with certain habitat types that are elevation dependent, and therefore, have a particular set of abiotic (e.g. water temperature, flow rate, water chemistry) and biotic conditions (e.g. in and out of water plant composition and structure, prey type and availability). Also, overall, there were more terrestrial vs. freshwater ecoregions across the continent, which arguably leads to greater sensitivity provided by the terrestrial ecoregions.

4.2 Freshwater ecoregions

The freshwater ecoregions, as described by Abell *et al.* (2008), were established according to the distributions and compositions of the world's freshwater fish species. According to this study, these ecoregions are a function of various filters, such continental-scale filters (mountains and glaciation) that define large biogeographical patterns, regional-scale filters (climatic patterns and dispersal barriers such as catchments), and sub-regional and fine-scale filters (macrohabitats). The dispersal

barriers, catchments or watersheds, are particularly distinctive to freshwater ecoregions as their hydrological processes influence freshwater species, whether or not they are confined to the freshwater environment.

This has a similar conceptual base as the River Continuum Concept (RCC), which describes how biological communities react to physical changes along the length of a river, from the source to the mouth (Vannote *et al.* 1980). For example, in eastern KwaZulu-Natal (Zambezian Lowveld, no. 76 in Fig. 5.2) the genus *Pseudagrion* has a distinctive latitudinal (as the rivers run from east to west) and elevational spread of species (within five sections) across the freshwater system (Samways 2008). In section 1, at the source of the system, the species *P. caffrum* (1 400 – 2 200 m elevation) and *P. spernatum* (800 – 2 000 m elevation) occur. In section 2, *P. inopinatum* (1 000 m elevation) occurs, while in section three, about mid-way of the system, *P. gamblesi* (700 – 1 400 m elevation) and *P. sublacteum* (up to 700 m elevation) occur. Then in section 4, there is *P. kersteni* (50 – 1 600 m elevation) and *P. massaicum* (rarely above 1 400 m elevation), and in section 5, near the mouth of the system, *P. commoniae* (up to 700 m elevation) and *P. acaciae* (below 300 m) occur. There is some overlap of species within and among the sections, although *P. caffrum* and *P. acaciae* do not overlap at all. Also, *P. salisburyense* occurs nearly across most of the system (200 – 1 600 m elevation), while species such as *P. citricola* (1 200 – 1 500 m) and *P. coeleste* occur within pools at specific elevations. In this context, using the dragonfly assemblages and their corresponding ADBI scores (0 – 9), according to the freshwater ecoregions, may be useful for freshwater managers.

However, it has been demonstrated that catchments (i.e. from the source all the way to the lower reaches) are predisposed to overestimate the distribution of dragonfly species and include large areas of land that do not represent the species' habitat requirements (Simaika & Samways 2010). Therefore, in this context, using the freshwater ecoregions to described species assemblages and thus, the ADBI, may be problematic.

4.3. The African countries and their ecoregions

Where there are not enough data for developing a national DBI according to the national borders of the African countries, there are some areas on the continent where a local DBI could be developed using terrestrial ecoregions instead, assuming no gathering of further data to develop a national DBI. Thus, countries that have few recorded species within their borders (i.e. those that fall within the fourth quartile as assessed in Chapter 4) can use the data documented according to the ecoregions that described their biogeographical environment, e.g. Chad has 45 recorded species and 251 records, but can also be assessed according to the species and records documented in the eight terrestrial and three freshwater ecoregions that describe its biogeographical environment. Furthermore, some countries have a better description of species assemblages, but have a limited species distribution range as the

areas consist of mostly desert or semi-desert areas, but could use ecoregion data to create a regional bioassessment of their freshwater systems, e.g. Libya and Egypt. The terrestrial ecoregion, Nile Delta Flooded Savanna (no. 94 in Fig. 5.1), for example, could develop its own regional DBI. The African countries with their respective terrestrial and freshwater ecoregions are listed in Appendix D5. As freshwater systems are so threatened both in Africa and elsewhere this would an expedient way to get started on freshwater assessment and monitoring schemes.

REFERENCES

Abell, R., Thieme, M.L., Revenga, C., Bryer, M., Kottelat, M., Bogutskaya, N., Coad, B., Mandrak, N., Balderas, S.C., Bussing, W., Stiassny, M.L.J., Skelton, P., Allen, G.R., Unmack, P., Naseka, A., Ng, R., Sindorf, N., Robertson, J., Armijo, E., Higgins, J.V., Heibel, T.J., Wikramanayake, E., Olson, D., López, H.L., Reis, R.E., Lundberg, J.G., Sabaj Pérez, M.H. and Petry, P. 2008. Freshwater ecoregions of the World: A new map of biogeographic units for freshwater biodiversity conservation. *BioScience* **58**: 403-414.

Anderson, M.J. 2001. A new method for non-parametric multivariate analysis of variance. *Austral Ecology* **26**: 32-46.

Butchart, S.H.M., Walpole, M., Collen, B., Van Strien, A., Scharlemann, J.P.W., Almond, R.E.A., Baillie, J.E.M., Bomhard, B., Brown, C., Bruno, J., Carpenter, K.E., Carr, G.M., Chanson, J., Chenery, A.M., Csirke, J., Davidson, N.C., Dentener, F., Foster, M., Galli, A., Galloway, J.N., Genovesi, P., Gregory, R.D., Hockings, M., Kapos, V., Lamarque, J.-F., Leverington, F., Loh, J., McGeoch, M.A., McRae, L., Minasyan, A., Hernández Morcillo, M., Oldfield, T.E.E., Pauly, D., Quader, S., Revenga, C., Sauer, J.R., Skolnik, B., Spear, D., Stanwell-Smith, D., Stuart, S.N., Symes, A., Tierney, M., Tyrrell, T.D., Vié, J.-C. and Watson, R. 2010. Global biodiversity: Indicators of recent declines. *Science* **28**: 1164-1168.

Chovanec, A., Schindler, M, Waringer, J. and Wimmer, R. 2015. The Dragonfly Association Index (Insecta: Odonata) – A tool for the type-specific assessment of lowland rivers. *River Research and Applications* **31**: 627-638.

Clark, T.E. and Samways, M.J. 1996. Dragonflies (Odonata) as indicators of biotope quality in the Kruger National Park, South Africa. *Journal of Applied Ecology* **33**: 1001-1012.

Clarke, K.R. and Warwick, R.M. 2001. *Change in marine communities: An approach to statistical analysis and interpretation, 2nd edition*. PRIMER-E Ltd., Plymouth, UK.

Clausnitzer, V., Dijkstra, K.-D.B., Koch, R., Boudot, J.-P., Darwall, W.R.T., Kipping, J., Samraoui, B., Samways, M.J., Simaika, J.P. and Suhling, F. 2012. Focus on African freshwaters: hotspots of dragonfly diversity and conservation concerns. *Frontiers in Ecology and the Environment* **10**: 129-134.

Clausnitzer, V., Kalkman, V.J., Ram, M., Collen, B., Baillie, J.E.M., Bedjanič, M., Darwall, W.R.T., Dijkstra, K.-D.B., Dow, R., Hawking, J., Karube, H., Malikova, E., Paulson, D., Schütte, K., Suhling, F., Villanueva, R.J., Von Ellenrieder, N. and Wilson, K. 2009. Odonata enter the biodiversity crisis debate: The first global assessment of an insect group. *Biological Conservation* **142**: 1864-1869.

Corbet, P.S. 1999. *Dragonflies: Behaviour and Ecology of Odonata*. Harley Books, Colchester, UK.

Darwall, W.R.T., Smith, K.G., Allen, D.J., Holland, R.A., Harrison, I.J. and Brooks, E.G.E. (eds.). 2011. *The Diversity of Life in African Freshwaters: Under Water, Under Threat. An analysis of the status and distribution of freshwater species throughout mainland Africa.* IUCN, Cambridge, UK and Gland, Switzerland.

Dell Inc. 2016. *Dell STATISTICA (data analysis software system)*, version 13. www.statsoft.com.

De Olieveira-Junior, J.M.B., Shimano, Y., Gardner, T.A., Hughes, R.M., De Marco Júnior, P. and Juen, L. 2015. Neotropical dragonflies (Insecta: Odonata) as indicators of ecological condition of small streams in the eastern Amazon. *Austral Ecology* **40**: 733-744.

Dijkstra, K.-D.B., Boudot, J.-P., Clausnitzer, V., Kipping, J., Kisakye, J.J., Ogbogu, S.S., Samraoui, B., Samways, M.J., Schütte, K., Simaika, J.P., Suhling, F. and Tchibozo, S.L. 2011. Dragonflies and damselflies of Africa (Odonata): history, diversity, distribution, and conservation. In: W.R.T Darwall, K.G. Smith, D.J. Allen, R.A. Holland, I.J. Harrison and E.G.E Brooks (eds.), *The Diversity of Life in African Freshwaters: Under Water, Under Threat. An analysis of the status and distribution of freshwater species throughout mainland Africa*, pp. 126-177. IUCN, Cambridge, UK and Gland, Switzerland.

Dijkstra, K.-D.B. and Clausnitzer, V. 2014. *The dragonflies and damselflies of Eastern Africa. Handbook for all Odonata from Sudan to Zimbabwe*. Studies in Afrotropical Zoology, vol. 298. Royal Museum for Central Africa, Tervuren, Belgium.

Dudgeon, D., Arthington, A.H., Gessner, M.O., Kawabata, Z.-I., Knowler, D.J., Lévêque, C., Naiman, R.J., Prieur-Richard, A.-H., Soto, D., Stiassny, M.L.J. and Sullivan, C.A. 2006. Freshwater biodiversity: importance, threats, status and conservation challenges. *Biological Reviews* **81**: 163-182.

Dutra, S. and De Marco, P. 2015. Bionomic differences in odonates and their influence on the efficiency of indicator species of environmental quality. *Ecological Indicators* **49**: 132-142.

ESRI (Environmental Systems Resource Institute). 2010. *ArcMap 10.0*. ESRI Inc., Redlands, California, USA.

Golfieri, B., Hardersen, S., Maiolini, B. and Surian, N. 2016. Odonates as indicators of the ecological integrity of the river corridor: Development and application of the Odonate River Index (ORI) in northern Italy. *Ecological Indicators* **61**: 234-247.

IUCN (International Union for Conservation of Nature and Natural Resources). 2016. *IUCN Red List Categories and Criteria: Version 3.1*. Second edition. IUCN, Gland, Switzerland and Cambridge, UK.

Kalkman, V.J., Clausnitzer, V., Dijkstra, K.-D.B., Orr, A.G., Paulson, D.R. and Van Tol, J. 2008. Global diversity of dragonflies (Odonata) in freshwater. *Hydrobiologia* **595**: 351-363.

Kietzka, G.J., Pryke, J.S. and Samways, M.J. 2017. Aerial adult dragonflies are highly sensitive to in-water conditions across an ancient landscape. *Diversity and Distributions* **23**: 14-26.

Kipping, J., Dijkstra, K.-D.B., Clausnitzer, V., Suhling, F. and Schütte, K. 2009. Odonata Database of Africa (ODA). *Agrion* **13**: 20-23.

Kutcher, T.E. and Bried, J.T. 2014. Adult Odonata conservatism as an indicator of freshwater wetland condition. *Ecological Indicators* **38**: 31-39.

Martín, R. and Maynou, X. 2016. Dragonflies (Insecta: Odonata) as indicators of habitat quality in Mediterranean streams and rivers in the province of Barcelona (Catalonia, Iberian Peninsula). *International Journal of Odonatology* **19**: 107-124.

Oertli, B. 2008. The use of dragonflies in the assessment and monitoring of aquatic habitats. In: A. Córdoba-Aguilar (ed.), *Dragonflies and Damselflies: Model organisms for Ecological and Evolutionary Research*, pp. 79-95. Oxford University Press, Oxford.

Olson, D.M. and Dinerstein, E. 1998. The Global 200: A representation approach to conserving the earth's most biologically valuable ecoregions. *Conservation Biology* **12**: 502-515.

Olson, D.M., Dinerstein, E., Wikramanayake, E.D., Burgess, N.D., Powell, G.V.N., Underwood, E.C., D'Amico, J.A., Itoua, I., Strand, H.E., Morrison, J.C., Loucks, C.J., Allnutt, T.F., Ricketts, T.H., Kura, Y., Lamoreux, J.F., Wettengel, W.W., Hedao, P. and Kassem, K.R. 2001. Terrestrial ecoregions of the world: A new map of life on earth. *BioScience* **51**: 933-938.

Panzer, R. and Schwartz, M.W. 1998. Effectiveness of a vegetation-based approach to insect conservation. *Conservation Biology* **12**: 693-702.

PRIMER-E. 2008. *PERMANOVA and PRIMER 6*. PRIMER-E, Lutton, UK.

Revenga, C., Campbell, I., Abell, R., De Villiers, P. and Bryer, M. 2005. Prospects for monitoring freshwater ecosystems towards the 2010 Targets. *Philosophical Transactions of the Royal Society: Biological Sciences* **360**: 397-413.

Rosenzweig, M.L. 1995. *Species diversity in space and time*. Cambridge University Press, Cambridge, UK.

Samways, M.J. 2005. Dragonflies: sensitive indicators of freshwater health. In: M.L. Thieme, R. Abell, M.L.J. Stiassny, P. Skelton, B. Lehner, G.G. Teugels, E. Dinerstein, A.K. Toham, N. Burgess and D. Olson (eds.), *Freshwater Ecoregions of Africa and Madagascar: A conservation assessment*, pp. 19-21. Island Press, Washington DC, USA.

Samways, M.J. 2008. *Dragonflies and Damselflies of South Africa*. Pensoft, Sophia, Bulgaria.

Samways, M.J. and Sharratt, N.J. 2010. Recovery of endemic dragonflies after removal of invasive alien trees. *Conservation Biology* **24**: 267-277.

Samways, M.J. and Simaika, J.P. 2016. *Manual of Freshwater Assessment for South Africa: Dragonfly Biotic Index*. *Suricata* 2. South African National Biodiversity Institute, Pretoria, South Africa.

Samways, M.J. and Taylor, S. 2004. Impacts of invasive alien plants on Red-listed South African dragonflies (Odonata). *South African Journal of Science* **100**: 78-80.

Silva, D. de paiva, De Marco, P. and Resende, D.C. 2010. Adult odonate abundance and community assemblage measures as indicators of stream ecological integrity: A case study. *Ecological Indicators* **10**: 744-752.

Simaika, J.P. and Samways, M. J. 2009. An easy-to-use index of ecological integrity for prioritizing freshwater sites and for assessing habitat quality. *Biodiversity and Conservation* **18**: 1171-1185.

Simaika, J.P. and Samways, M.J. 2010. Large-scale estimators of threatened freshwater catchment species relative to practical conservation management. *Biological Conservation* **143**: 311-320.

Simaika, J.P. and Samways, M.J. 2011. Comparative assessment of indices of freshwater habitat conditions using different invertebrate taxon sets. *Ecological Indicators* **11**: 370-378.

Simaika, J.P. and Samways, M.J. 2012. Using dragonflies to monitor and prioritize lotic systems: a South African perspective. *Organisms, Diversity and Evolution* **12**: 251-259.

Simaika, J.P., Samways, M.J., Kipping, J., Suhling, F., Dijkstra, K.-D.B., Clausnitzer, V., Boudot, J.-P. and Domisch, S. 2013. Continental-scale conservation prioritization of African dragonflies. *Biological Conservation* **157**: 245-254.

Smith, J., Samways, M.J. and Taylor, S. 2007. Assessing riparian quality using two complementary sets of bioindicators. *Biodiversity and Conservation* **16**: 2695-2713.

The Nature Conservancy. 2013. *TNC Maps: Terrestrial and Freshwater Ecoregions*. http://maps.tnc.org/gis_data.html.

UNEP (United Nations Environment Programme) and AMCEN Secretariat. 2002. *Africa environment outlook: past, present, and future perspectives*. Earthprint for and on behalf of the United Nations Environment Programme, Stevenage, Hertfordshire.

Valente-Neto, F., Roque, F. de Oliveira, Rodrigues, M.E., Juen, L. and Swan, C.M. 2016. Toward a practical use of Neotropical odonates as bioindicators: Testing congruence across taxonomic resolution and life stages. *Ecological Indicators* **61**: 952-959.

Vannote, R.L., Minshall, G.W., Cummins, K.W., Sedell, J.R. and Cushing, C.E. 1980. The river continuum concept. *Canadian Journal of Fisheries and Aquatic Sciences* **37**: 130-137.

Wright, M.G. and Samways, M.J. 1998. Insect species richness tracking plant species richness in a diverse flora: gall-insects in the Cape Floristic Region, South Africa. *Oecologia* **115**: 427-433.

APPENDIX D1: The recorded data on the dragonfly species according to the terrestrial ecoregions of the African continent.

The recorded data on the dragonfly species according to the terrestrial ecoregions of the African continent. The data includes: the recorded total number of species and records per ecoregion; the number of species recorded per IUCN/SSC Red List threat status; and the number of species recorded per African Dragonfly Biotic Index scores (0 to 9). The IUCN/SSC threat status abbreviations used (IUCN 2016): LC – Least Concern, NT – Near Threatened, DD – Data Deficient, VU – Vulnerable, EN – Endangered and CR – Critically Endangered. The African continent is represented by 105 terrestrial ecoregions, as described by Olson *et al.* (2001). Though, only 102 terrestrial ecoregions are shown within this list as three of these ecoregions do not have dragonfly species recorded within their perimeters, i.e. Western Zambezian Grasslands (AT0724); East African Halophytics (AT0901); and Eritrean Coastal Desert (AT1304).

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records	IUCN Red List threat status						African Dragonfly Biotic Index scores									
				LC	NT	DD	VU	EN	CR	0	1	2	3	4	5	6	7	8	9
AT0101	Albertine Rift Montane Forests	179	1 417	174	3	0	0	1	1	32	43	32	35	26	6	2	1	2	0
AT0102	Atlantic Equatorial Coastal Forests	175	1 769	172	2	1	0	0	0	28	35	26	38	36	8	4	0	0	0
AT0103	Cameroonian Highlands Forests	105	910	99	1	1	2	1	1	17	17	17	22	17	9	2	2	0	2
AT0104	Central Congolian Lowland Forests	49	117	49	0	0	0	0	0	5	9	13	11	10	1	0	0	0	0
AT0106	Cross-Niger Transition Forests	12	16	12	0	0	0	0	0	3	3	4	1	1	0	0	0	0	0
AT0107	Cross-Sanaga-Bioko Coastal Forests	166	1 490	159	1	2	1	2	1	24	28	25	39	31	13	2	1	0	3
AT0108	East African Montane Forests	75	268	71	1	0	1	1	1	14	23	15	14	5	1	1	0	1	1

APPENDIX D1: (*continued*)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records	IUCN Red List threat status						African Dragonfly Biotic Index scores									
				LC	NT	DD	VU	EN	CR	0	1	2	3	4	5	6	7	8	9
AT0109	Eastern Arc Forests	97	471	91	1	0	3	1	1	14	29	24	17	5	3	2	1	0	2
AT0110	Eastern Congolian Swamp Forests	132	782	132	0	0	0	0	0	21	24	29	34	18	6	0	0	0	0
AT0111	Eastern Guinean Forests	163	1 759	163	0	0	0	0	0	32	47	34	26	18	6	0	0	0	0
AT0112	Ethiopian Montane Forests	77	306	67	4	0	4	2	0	18	25	11	10	5	1	4	1	1	1
AT0114	Guinean Montane Forests	147	1 760	147	0	0	0	0	0	29	39	30	19	23	7	0	0	0	0
AT0115	Knysna-Amatole Montane Forests	43	610	38	2	0	2	1	0	6	10	7	5	10	1	2	1	1	0
AT0116	Kwazulu-Cape Coastal Forest Mosaic	100	1 555	99	0	0	0	1	0	19	33	23	17	6	1	0	0	0	1
AT0119	Maputaland Coastal Forest Mosaic	109	1 847	109	0	0	0	0	0	25	39	23	18	4	0	0	0	0	0
AT0121	Mount Cameroon and Bioko Montane Forests	22	32	20	0	1	1	0	0	0	1	3	7	7	3	0	1	0	0
AT0122	Niger Delta Swamp Forests	34	142	34	0	0	0	0	0	9	10	8	5	2	0	0	0	0	0
AT0123	Nigerian Lowland Forests	86	208	86	0	0	0	0	0	23	21	20	11	9	2	0	0	0	0
AT0124	Northeastern Congolian Lowland Forests	157	672	156	1	0	0	0	0	23	32	35	36	23	7	0	1	0	0
AT0125	Northern Zanzibar-Inhambane Coastal Forest Mosaic	107	1 189	103	1	0	2	1	0	25	37	21	13	6	2	1	1	0	1

APPENDIX D1: (*continued*)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records	IUCN Red List threat status						African Dragonfly Biotic Index scores									
				LC	NT	DD	VU	EN	CR	0	1	2	3	4	5	6	7	8	9
AT0126	Northwestern Congolian Lowland Forests	198	2 474	194	3	1	0	0	0	26	39	36	45	36	10	6	0	0	0
AT0128	Southern Zanzibar-Inhambane Coastal Forest Mosaic	46	120	43	1	0	2	0	0	8	11	13	6	4	2	2	0	0	0
AT0129	Western Congolian Swamp Forests	142	949	142	0	0	0	0	0	25	28	32	32	21	4	0	0	0	0
AT0130	Western Guinean Lowland Forests	183	4 087	181	1	0	0	1	0	34	45	37	28	27	10	1	0	1	0
AT0203	Zambezian Cryptosepalum Dry Forests	2	2	2	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
AT0701	Angolan Miombo Woodlands	112	1 156	109	3	0	0	0	0	23	36	19	20	11	3	0	0	0	0
AT0702	Angolan Mopane Woodlands	48	301	48	0	0	0	0	0	15	22	7	3	1	0	0	0	0	0
AT0704	Central Zambezian Miombo Woodlands	265	7 696	257	4	1	3	0	0	32	51	55	72	42	8	4	1	0	0
AT0705	East Sudanian Savanna	135	458	134	1	0	0	0	0	31	53	29	16	4	2	0	0	0	0
AT0706	Eastern Miombo Woodlands	97	405	91	2	0	3	1	0	20	33	24	11	4	1	2	1	0	1
AT0707	Guinean Forest-Savanna Mosaic	177	2 649	175	0	0	1	0	1	37	52	31	28	21	6	0	1	0	1

APPENDIX D1: (*continued*)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records	IUCN Red List threat status						African Dragonfly Biotic Index scores									
				LC	NT	DD	VU	EN	CR	0	1	2	3	4	5	6	7	8	9
AT0708	Itigi-Sumbu Thicket	1	2	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
AT0709	Kalahari Acacia-Baikiaea Woodlands	88	957	88	0	0	0	0	0	23	30	21	9	5	0	0	0	0	0
AT0710	Mandara Plateau Mosaic	15	40	15	0	0	0	0	0	4	10	1	0	0	0	0	0	0	0
AT0711	Northern Acacia-Commiphora Bushlands and Thickets	128	1 456	125	1	0	1	0	1	26	43	31	19	6	1	1	0	1	0
AT0712	Northern Congolian Forest-Savanna Mosaic	207	730	207	0	0	0	0	0	32	47	51	43	26	8	0	0	0	0
AT0713	Sahelian Acacia Savanna	79	989	78	1	0	0	0	0	23	35	9	8	4	0	0	0	0	0
AT0714	Serengeti Volcanic Grasslands	2	2	2	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
AT0715	Somali Acacia-Commiphora Bushlands and Thickets	75	414	72	1	0	1	1	0	24	29	7	9	4	0	1	0	0	1
AT0716	Southern Acacia-Commiphora Bushlands and Thickets	89	191	88	1	0	0	0	0	23	33	18	11	3	1	0	0	0	0
AT0717	Southern Africa Bushveld	126	5 320	125	1	0	0	0	0	25	38	32	18	10	3	0	0	0	0
AT0718	Southern Congolian Forest-Savanna Mosaic	124	445	123	1	0	0	0	0	20	32	26	27	16	2	1	0	0	0
AT0719	Southern Miombo Woodlands	142	1 971	139	2	0	1	0	0	27	40	33	28	9	3	2	0	0	0

APPENDIX D1: (*continued*)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records	IUCN Red List threat status						African Dragonfly Biotic Index scores									
				LC	NT	DD	VU	EN	CR	0	1	2	3	4	5	6	7	8	9
AT0721	Victoria Basin Forest-Savanna Mosaic	194	3 195	187	3	0	1	2	1	34	49	44	33	22	5	3	1	2	1
AT0722	West Sudanian Savanna	137	2 704	137	0	0	0	0	0	37	49	28	14	7	2	0	0	0	0
AT0723	Western Congolian Forest-Savanna Mosaic	261	9 149	257	4	0	0	0	0	29	46	51	68	51	11	5	0	0	0
AT0725	Zambezian and Mopane Woodlands	174	8 616	167	5	2	0	0	0	28	46	37	34	23	6	0	0	0	0
AT0726	Zambezian Baikiaea Woodlands	115	2 385	110	4	1	0	0	0	27	39	23	14	8	4	0	0	0	0
AT0902	Etosha Pan Halophytics	23	109	23	0	0	0	0	0	8	14	0	1	0	0	0	0	0	0
AT0903	Inner Niger Delta Flooded Savanna	12	48	12	0	0	0	0	0	2	10	0	0	0	0	0	0	0	0
AT0904	Lake Chad Flooded Savanna	6	12	6	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0
AT0905	Saharan Flooded Grasslands	38	94	38	0	0	0	0	0	10	21	4	2	1	0	0	0	0	0
AT0906	Zambezian Coastal Flooded Savanna	57	217	57	0	0	0	0	0	11	24	10	10	2	0	0	0	0	0
AT0907	Zambezian Flooded Grasslands	139	4 594	135	3	1	0	0	0	28	45	27	24	12	3	0	0	0	0
AT0908	Zambezian Halophytics	23	68	23	0	0	0	0	0	9	12	0	2	0	0	0	0	0	0
AT1001	Angolan Montane Forest-Grassland Mosaic	34	94	33	1	0	0	0	0	8	9	5	7	4	1	0	0	0	0

APPENDIX D1: (*continued*)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records	IUCN Red List threat status						African Dragonfly Biotic Index scores									
				LC	NT	DD	VU	EN	CR	0	1	2	3	4	5	6	7	8	9
AT1002	Angolan Scarp Savanna and Woodlands	29	52	27	2	0	0	0	0	13	11	1	2	1	1	0	0	0	0
AT1003	Drakensberg Alti-Montane Grasslands and Woodlands	27	124	27	0	0	0	0	0	2	6	6	4	7	2	0	0	0	0
AT1004	Drakensberg Montane Grasslands, Woodlands and Forests	121	6 284	115	2	0	2	2	0	22	35	27	18	11	4	1	1	1	1
AT1005	East African Montane Moorlands	13	18	12	0	0	1	0	0	2	3	2	3	2	0	1	0	0	0
AT1006	Eastern Zimbabwe Montane Forest-Grassland Mosaic	107	809	103	3	0	1	0	0	18	30	28	20	5	3	3	0	0	0
AT1007	Ethiopian Montane Grasslands and Woodlands	70	443	61	3	0	4	2	0	15	26	10	7	4	1	4	1	1	1
AT1008	Ethiopian Montane Moorlands	8	18	5	1	0	1	1	0	0	1	2	1	1	0	1	1	0	1
AT1009	Highveld Grasslands	85	2 744	85	0	0	0	0	0	18	25	20	13	8	1	0	0	0	0
AT1010	Jos Plateau Forest-Grassland Mosaic	89	264	89	0	0	0	0	0	26	33	19	9	2	0	0	0	0	0
AT1012	Maputaland-Pondoland Bushland and Thickets	93	881	92	0	0	0	1	0	19	31	18	14	9	1	0	0	0	1

APPENDIX D1: (*continued*)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records	IUCN Red List threat status						African Dragonfly Biotic Index scores									
				LC	NT	DD	VU	EN	CR	0	1	2	3	4	5	6	7	8	9
AT1013	Ruwenzori-Virunga Montane Moorlands	16	25	16	0	0	0	0	0	6	2	1	4	3	0	0	0	0	0
AT1014	South Malawi Montane Forest-Grassland Mosaic	96	850	93	1	0	1	0	1	15	32	28	15	2	2	1	0	0	1
AT1015	Southern Rift Montane Forest-Grassland Mosaic	60	217	60	0	0	0	0	0	13	20	13	10	3	1	0	0	0	0
AT1201	Albany Thickets	35	142	33	0	0	1	1	0	7	9	7	5	4	1	1	0	0	1
AT1202	Lowland Fynbos and Renosterveld	63	810	54	3	0	4	1	1	8	16	12	8	10	1	3	3	2	0
AT1203	Montane Fynbos and Renosterveld	68	2 104	57	3	0	4	2	2	10	14	14	9	10	1	3	3	3	1
AT1303	East Saharan Montane Xeric Woodlands	20	92	20	0	0	0	0	0	6	10	3	1	0	0	0	0	0	0
AT1305	Ethiopian Xeric Grasslands and Shrublands	16	79	16	0	0	0	0	0	4	10	1	0	1	0	0	0	0	0
AT1307	Hobyo Grasslands and Shrublands	10	13	10	0	0	0	0	0	2	8	0	0	0	0	0	0	0	0
AT1309	Kalahari Xeric Savanna	67	1 580	67	0	0	0	0	0	20	26	9	7	4	1	0	0	0	0
AT1310	Kaokoveld Desert	13	39	13	0	0	0	0	0	3	10	0	0	0	0	0	0	0	0
AT1313	Masai Xeric Grasslands and Shrublands	10	17	10	0	0	0	0	0	2	6	1	1	0	0	0	0	0	0
AT1314	Nama Karoo	57	610	57	0	0	0	0	0	10	19	14	7	6	1	0	0	0	0

APPENDIX D1: (*continued*)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records	IUCN Red List threat status						African Dragonfly Biotic Index scores									
				LC	NT	DD	VU	EN	CR	0	1	2	3	4	5	6	7	8	9
AT1315	Namib Desert	23	172	23	0	0	0	0	0	6	13	2	1	1	0	0	0	0	0
AT1316	Namibian Savanna Woodlands	70	2 363	69	1	0	0	0	0	21	28	14	4	2	1	0	0	0	0
AT1317	Red Sea Coastal Desert	8	19	8	0	0	0	0	0	2	6	0	0	0	0	0	0	0	0
AT1319	Somali Montane Xeric Woodlands	18	54	18	0	0	0	0	0	4	12	2	0	0	0	0	0	0	0
AT1322	Succulent Karoo	39	160	38	1	0	0	0	0	6	13	7	6	7	0	0	0	0	0
AT1401	Central African Mangroves	81	199	81	0	0	0	0	0	21	21	14	13	11	1	0	0	0	0
AT1402	East African Mangroves	42	98	41	0	0	1	0	0	11	23	6	1	0	0	0	1	0	0
AT1403	Guinean Mangroves	74	456	74	0	0	0	0	0	23	38	8	4	1	0	0	0	0	0
AT1405	Southern Africa Mangroves	73	680	73	0	0	0	0	0	19	30	11	11	1	1	0	0	0	0
AT9898	Lake: Afrotropic	124	460	121	3	0	0	0	0	26	40	24	19	11	3	1	0	0	0
PA0513	Mediterranean Conifer and Mixed Forests	53	727	48	2	1	1	0	1	5	8	3	11	19	5	1	1	0	0
PA0904	Nile Delta Flooded Savanna	26	431	26	0	0	0	0	0	6	13	4	3	0	0	0	0	0	0
PA0905	Saharan Halophytics	26	675	26	0	0	0	0	0	4	11	2	3	6	0	0	0	0	0
PA1010	Mediterranean High Atlas Juniper Steppe	6	17	6	0	0	0	0	0	1	1	0	1	2	1	0	0	0	0
PA1212	Mediterranean Acacia-Argania Dry Woodlands and Succulent Thickets	43	802	42	1	0	0	0	0	5	12	3	8	13	2	0	0	0	0

APPENDIX D1: (*continued*)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records	IUCN Red List threat status						African Dragonfly Biotic Index scores									
				LC	NT	DD	VU	EN	CR	0	1	2	3	4	5	6	7	8	9
PA1213	Mediterranean Dry Woodlands and Steppe	52	779	49	2	0	0	0	1	7	14	3	10	16	1	0	1	0	0
PA1214	Mediterranean Woodlands and Forests	64	4 745	59	2	1	1	0	1	6	13	5	13	19	6	1	1	0	0
PA1304	Atlantic Coastal Desert	8	21	8	0	0	0	0	0	3	4	0	1	0	0	0	0	0	0
PA1321	North Saharan Steppe and Woodlands	38	944	37	1	0	0	0	0	6	14	4	7	7	0	0	0	0	0
PA1327	Sahara Desert	33	748	33	0	0	0	0	0	7	16	4	5	1	0	0	0	0	0
PA1329	South Saharan Steppe and Woodlands	13	69	12	1	0	0	0	0	2	7	1	2	1	0	0	0	0	0
PA1331	Tibesti-Jebel Uweinat Montane Xeric Woodlands	6	29	6	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0
PA1332	West Saharan Montane Xeric Woodlands	19	364	18	1	0	0	0	0	5	10	1	2	1	0	0	0	0	0

APPENDIX D2: The recorded data on the dragonfly species according to the freshwater ecoregions of the African continent.

The recorded data on the dragonfly species according to the freshwater ecoregions of the African continent. The data includes: the recorded total number of species and records per ecoregion; the number of species recorded per IUCN/SSC Red List threat status; and the number of species recorded per African Dragonfly Biotic Index scores (0 to 9). The IUCN/SSC threat status abbreviations used (IUCN 2016): LC – Least Concern, NT – Near Threatened, DD – Data Deficient, VU – Vulnerable, EN – Endangered and CR – Critically Endangered. The African continent is represented by 78 freshwater ecoregions, as described by Abell *et al.* (2008).

Eco-code	Freshwater ecoregion names	Number of spp.	Number of records	IUCN Red List threat status						African Dragonfly Biotic Index scores									
				LC	NT	DD	VU	EN	CR	0	1	2	3	4	5	6	7	8	9
501	Atlantic Northwest Africa	60	3 726	57	2	0	0	0	1	5	13	5	13	19	4	0	1	0	0
502	Mediterranean Northwest Africa	62	4 112	57	2	1	1	0	1	6	13	5	13	19	4	1	1	0	0
503	Sahara	36	1 278	35	1	0	0	0	0	6	14	2	6	8	0	0	0	0	0
504	Dry Sahel	34	594	33	1	0	0	0	0	8	18	3	3	2	0	0	0	0	0
505	Lower Niger – Benue	170	1 359	168	0	0	1	0	1	35	49	32	28	18	6	0	1	0	1
506	Niger Delta	44	164	44	0	0	0	0	0	12	12	12	6	2	0	0	0	0	0
507	Upper Niger	86	270	86	0	0	0	0	0	27	35	8	6	8	2	0	0	0	0
508	Inner Niger Delta	19	137	19	0	0	0	0	0	4	15	0	0	0	0	0	0	0	0
509	Senegal – Gambia	95	2 205	95	0	0	0	0	0	33	48	8	4	1	1	0	0	0	0
510	Fouta – Djalon	7	8	7	0	0	0	0	0	2	3	1	0	1	0	0	0	0	0
511	Northern Upper Guinea	159	1 590	159	0	0	0	0	0	31	41	32	24	23	8	0	0	0	0
512	Southern Upper Guinea	185	4 226	183	1	0	0	1	0	35	46	38	27	27	10	1	0	1	0

APPENDIX D2: (*continued*)

Eco-code	Freshwater ecoregion names	Number of spp.	Number of records	IUCN Red List threat status						African Dragonfly Biotic Index scores									
				LC	NT	DD	VU	EN	CR	0	1	2	3	4	5	6	7	8	9
513	Mount Nimba	97	344	96	1	0	0	0	0	16	20	18	17	18	7	1	0	0	0
514	Eburneo	138	584	138	0	0	0	0	0	34	48	29	15	10	2	0	0	0	0
515	Ashanti	131	899	131	0	0	0	0	0	29	36	25	21	16	4	0	0	0	0
516	Volta	143	1 342	143	0	0	0	0	0	34	47	29	17	11	5	0	0	0	0
517	Bight Drainages	140	1 456	140	0	0	0	0	0	32	47	26	17	12	6	0	0	0	0
518	Northern Gulf of Guinea Drainages	150	890	142	1	2	2	2	1	21	30	25	28	26	13	2	2	0	3
519	Western Equatorial Crater Lakes	136	1 386	129	1	2	2	2	0	20	22	19	32	26	11	2	2	0	2
520	Lake Chad	75	357	75	0	0	0	0	0	21	36	11	7	0	0	0	0	0	0
521	Lake Victoria Basin	211	4 422	204	3	0	1	2	1	37	53	47	39	23	5	3	1	2	1
522	Upper Nile	182	1 276	181	1	0	0	0	0	35	51	44	30	17	4	0	1	0	0
523	Lower Nile	27	398	26	1	0	0	0	0	6	15	3	2	1	0	0	0	0	0
524	Nile Delta	27	469	27	0	0	0	0	0	6	13	5	3	0	0	0	0	0	0
525	Ethiopian Highlands	75	386	66	3	0	4	2	0	17	27	10	10	3	1	4	1	1	1
526	Lake Tana	29	72	27	1	0	1	0	0	8	9	7	2	2	0	1	0	0	0
527	Western Red Sea Drainages	25	81	24	1	0	0	0	0	4	13	3	2	3	0	0	0	0	0
528	Northern Eastern Rift	69	273	63	3	0	2	1	0	16	25	7	11	5	1	2	1	0	1
529	Horn of Africa	26	111	26	0	0	0	0	0	6	17	2	1	0	0	0	0	0	0
530	Lake Turkana	88	328	80	2	0	4	2	0	20	30	19	8	4	1	3	1	1	1
531	Shebelle – Juba	74	445	72	0	0	1	0	1	19	29	12	11	1	0	1	0	1	0

APPENDIX D2: (*continued*)

Eco-code	Freshwater ecoregion names	Number of spp.	Number of records	IUCN Red List threat status						African Dragonfly Biotic Index scores									
				LC	NT	DD	VU	EN	CR	0	1	2	3	4	5	6	7	8	9
532	Ogooue – Nyanga – Kouilou – Niari	226	9 750	224	2	0	0	0	0	28	41	42	51	49	10	5	0	0	0
533	Southern Gulf of Guinea Drainages – Bioko	182	1 931	178	3	1	0	0	0	28	36	27	40	37	9	5	0	0	0
534	Sangha	116	422	115	1	0	0	0	0	18	23	22	30	18	4	1	0	0	0
535	Sudanic Congo – Oubangi	148	684	147	0	1	0	0	0	25	34	31	31	22	5	0	0	0	0
536	Uele	174	501	174	0	0	0	0	0	28	42	42	35	20	7	0	0	0	0
537	Cuvette Centrale	168	1 099	168	0	0	0	0	0	23	31	40	42	25	7	0	0	0	0
538	Tumba	6	7	6	0	0	0	0	0	2	0	1	3	0	0	0	0	0	0
539	Upper Congo Rapids	138	735	138	0	0	0	0	0	23	26	30	34	20	5	0	0	0	0
540	Upper Congo	136	402	136	0	0	0	0	0	20	34	31	29	16	6	0	0	0	0
541	Albertine Highlands	39	54	37	2	0	0	0	0	8	5	8	10	4	2	1	1	0	0
542	Lake Tanganyika	165	1 004	164	1	0	0	0	0	26	45	35	36	17	5	1	0	0	0
543	Malagarasi – Moyowosi	22	24	22	0	0	0	0	0	12	8	1	0	0	1	0	0	0	0
544	Bangweulu – Mweru	193	2 996	189	2	0	2	0	0	30	48	40	45	24	4	1	1	0	0
545	Upper Lualaba	180	1 024	178	0	0	2	0	0	31	46	36	41	21	2	2	1	0	0
546	Kasai	132	472	131	1	0	0	0	0	19	34	28	31	16	3	1	0	0	0
547	Mai Ndombe	16	24	16	0	0	0	0	0	4	5	2	3	2	0	0	0	0	0
548	Malebo Pool	23	51	23	0	0	0	0	0	6	9	3	5	0	0	0	0	0	0
549	Lower Congo Rapids	85	344	85	0	0	0	0	0	16	24	16	17	11	1	0	0	0	0

APPENDIX D2: (*continued*)

Eco-code	Freshwater ecoregion names	Number of spp.	Number of records	IUCN Red List threat status						African Dragonfly Biotic Index scores									
				LC	NT	DD	VU	EN	CR	0	1	2	3	4	5	6	7	8	9
550	Lower Congo	53	70	53	0	0	0	0	0	11	15	8	15	3	1	0	0	0	0
551	Cuanza	155	1 092	153	2	0	0	0	0	27	37	30	35	20	6	0	0	0	0
552	Namib	74	3 322	73	1	0	0	0	0	22	29	15	5	2	1	0	0	0	0
553	Etosha	35	290	35	0	0	0	0	0	12	18	3	1	1	0	0	0	0	0
554	Karstveld Sink Holes	48	373	48	0	0	0	0	0	15	24	5	3	1	0	0	0	0	0
555	Zambezian Headwaters	197	2 597	194	2	1	0	0	0	26	45	41	50	29	5	1	0	0	0
556	Upper Zambezi Floodplains	113	2 575	109	4	0	0	0	0	27	39	21	13	9	4	0	0	0	0
557	Kafue	73	323	72	0	1	0	0	0	18	27	20	7	1	0	0	0	0	0
558	Middle Zambezi – Luangwa	145	1 819	142	1	2	0	0	0	27	43	37	26	10	2	0	0	0	0
559	Lake Malawi	139	1 862	136	2	0	1	0	0	25	44	33	21	12	3	1	0	0	0
560	Zambezian Highveld	119	1 449	119	0	0	0	0	0	25	38	30	20	5	1	0	0	0	0
561	Lower Zambezi	83	670	83	0	0	0	0	0	18	31	21	13	0	0	0	0	0	0
562	Mulanje	74	353	71	1	0	1	0	1	9	25	22	12	2	2	1	0	0	1
563	Eastern Zimbabwe Highlands	120	1 381	116	3	0	1	0	0	21	34	29	23	7	3	3	0	0	0
564	Coastal East Africa	135	1 291	128	2	0	3	1	1	25	38	30	22	11	4	2	1	0	2
565	Lake Rukwa	50	85	50	0	0	0	0	0	12	18	11	5	3	1	0	0	0	0
566	Southern Eastern Rift	81	384	79	1	0	1	0	0	20	26	15	15	3	1	1	0	0	0
567	Tana, Athi & Coastal Drainages	126	1 875	119	1	0	3	2	1	25	40	29	17	7	2	2	1	1	2

APPENDIX D2: (*continued*)

Eco-code	Freshwater ecoregion names	Number of spp.	Number of records	IUCN Red List threat status						African Dragonfly Biotic Index scores									
				LC	NT	DD	VU	EN	CR	0	1	2	3	4	5	6	7	8	9
568	Pangani	102	438	95	1	0	4	1	1	18	30	24	16	6	2	3	1	0	2
569	Okavango	105	6 912	101	3	1	0	0	0	24	35	21	13	10	2	0	0	0	0
570	Kalahari	56	638	56	0	0	0	0	0	20	24	6	5	1	0	0	0	0	0
571	Southern Kalahari	39	577	39	0	0	0	0	0	11	17	4	6	1	0	0	0	0	0
572	Western Orange	32	204	32	0	0	0	0	0	6	13	7	5	1	0	0	0	0	0
573	Karoo	20	90	20	0	0	0	0	0	4	8	3	3	2	0	0	0	0	0
574	Drakensberg – Maloti Highlands	48	628	47	0	0	1	0	0	6	12	9	10	8	2	1	0	0	0
575	Southern Temperate Highveld	125	12 848	120	2	0	1	2	0	24	36	27	19	12	4	0	1	1	1
576	Zambezian Lowveld	151	9 405	151	0	0	0	0	0	26	44	35	30	13	3	0	0	0	0
577	Amatolo – Winterberg Highlands	47	296	45	0	0	0	0	0	7	10	13	8	6	1	0	0	1	1
578	Cape Fold	75	3 866	64	3	0	4	2	2	10	20	15	9	10	1	3	3	3	1

APPENDIX D3: Lists of dragonfly species recorded within the terrestrial ecoregions of Africa.

The documented dragonfly species assemblages according to the terrestrial ecoregions of Africa. The African continent is represented by 105 terrestrial ecoregions, as described by Olson *et al.* (2001), although only 102 terrestrial ecoregions are shown within this list as three of these ecoregions do not have dragonfly species recorded within their perimeters, i.e. Western Zambezian Grasslands (AT0724); East African Halophytics (AT0901); and Eritrean Coastal Desert (AT1304). Below are the 102 terrestrial ecoregions with the specific dragonfly species (Anisoptera and Zygoptera) recorded within their boundaries. These records are presented as species lists according to the various ecoregions.

AT0101: Albertine Rift Montane Forests (179 species, 1 417 records)

Species	Species	Species	Species
Acisoma inflatum	*Azuragrion vansomereni*	*Gynacantha bullata*	*Neodythemis preussi*
Acisoma trifidum	*Brachythemis impartita*	*Gynacantha cylindrata*	*Nesciothemis farinosa*
Acisoma variegatum	*Brachythemis lacustris*	*Gynacantha manderica*	*Notiothemis jonesi*
Aethriamanta rezia	*Brachythemis leucosticta*	*Gynacantha nigeriensis*	*Notiothemis robertsi*
Africallagma elongatum	*Bradinopyga strachani*	*Gynacantha sextans*	*Notogomphus leroyi*
Africallagma pseudelongatum	*Ceriagrion glabrum*	*Gynacantha vesiculata*	*Notogomphus lujai*
Africallagma sinuatum	*Ceriagrion kordofanicum*	*Gynacantha villosa*	*Olpogastra lugubris*
Africallagma subtile	*Ceriagrion suave*	*Hadrothemis camarensis*	*Onychogomphus styx*
Africallagma vaginale	*Ceriagrion varians*	*Hadrothemis coacta*	*Orthetrum abbotti*
Afroaeschna scotias	*Chalcostephia flavifrons*	*Hadrothemis defecta*	*Orthetrum austeni*
Agriocnemis exilis	*Chlorocypha cancellata*	*Hadrothemis infesta*	*Orthetrum brachiale*
Agriocnemis gratiosa	*Chlorocypha curta*	*Heliaeschna cynthiae*	*Orthetrum caffrum*
Agriocnemis inversa	*Chlorocypha glauca*	*Heliaeschna fuliginosa*	*Orthetrum camerunense*
Agriocnemis maclachlani	*Chlorocypha trifaria*	*Heliaeschna ugandica*	*Orthetrum chrysostigma*
Agriocnemis palaeforma	*Chlorocypha victoriae*	*Hemicordulia africana*	*Orthetrum guineense*
Allocnemis nigripes	*Copera nyansana*	*Hemistigma albipunctum*	*Orthetrum hintzi*
Allocnemis pauli	*Copera sikassoensis*	*Ictinogomphus ferox*	*Orthetrum julia*
Allocnemis superba	*Crenigomphus hartmanni*	*Ictinogomphus regisalberti*	*Orthetrum machadoi*
Anaciaeschna triangulifera	*Crocothemis divisa*	*Ischnura senegalensis*	*Orthetrum microstigma*
Anax chloromelas	*Crocothemis erythraea*	*Lestes amicus*	*Orthetrum saegeri*
Anax ephippiger	*Crocothemis sanguinolenta*	*Lestes dissimulans*	*Orthetrum stemmale*
Anax imperator	*Diastatomma selysi*	*Lestes ictericus*	*Orthetrum trinacria*
Anax speratus	*Diplacodes lefebvrii*	*Lestes pallidus*	*Oxythemis phoenicosceles*
Anax tristis	*Diplacodes luminans*	*Lestes virgatus*	*Palpopleura deceptor*
Atoconeura biordinata	*Elattoneura cellularis*	*Lestinogomphus angustus*	*Palpopleura jucunda*
Atoconeura eudoxia	*Elattoneura lliba*	*Micromacromia camerunica*	*Palpopleura lucia*
Atoconeura pseudeudoxia	*Gomphidia bredoi*	*Neodythemis afra*	*Palpopleura portia*
Azuragrion nigridorsum	*Gynacantha africana*	*Neodythemis munyaga*	*Pantala flavescens*

AT0101: Albertine Rift Montane Forests (*continued*)

Species	Species	Species	Species
Paragomphus cognatus	*Pseudagrion glaucoideum*	*Tetrathemis corduliformis*	*Trithemis kirbyi*
Paragomphus genei	*Pseudagrion hageni*	*Thermochoria equivocata*	*Trithemis nuptialis*
Paragomphus viridior	*Pseudagrion hamoni*	*Thermochoria jeanneli*	*Trithemis pruinata*
Parazyxomma flavicans	*Pseudagrion kersteni*	*Tholymis tillarga*	*Trithemis stictica*
Phaon iridipennis	*Pseudagrion kibalense*	*Tramea basilaris*	*Trithemis tropicana*
Phyllogomphus annulus	*Pseudagrion massaicum*	*Tramea limbata*	*Trithemis werneri*
Phyllogomphus selysi	*Pseudagrion melanicterum*	*Trithemis aconita*	*Umma longistigma*
Phyllomacromia aureozona	*Pseudagrion nubicum*	*Trithemis annulata*	*Umma saphirina*
Phyllomacromia contumax	*Pseudagrion rufocinctum*	*Trithemis arteriosa*	*Urothemis assignata*
Phyllomacromia picta	*Pseudagrion sjoestedti*	*Trithemis dichroa*	*Urothemis edwardsii*
Phyllomacromia sylvatica	*Pseudagrion spernatum*	*Trithemis donaldsoni*	*Zosteraeschna ellioti*
Pinheyschna rileyi	*Pseudagrion sublacteum*	*Trithemis dorsalis*	*Zygonyx flavicosta*
Platycypha caligata	*Rhyothemis semihyalina*	*Trithemis furva*	*Zygonyx natalensis*
Platycypha lacustris	*Stenocypha jacksoni*	*Trithemis grouti*	*Zygonyx regisalberti*
Platycypha pinheyi	*Stenocypha molindica*	*Trithemis hecate*	*Zygonyx torridus*
Porpax garambensis	*Stenocypha tenuis*	*Trithemis imitata*	*Zyxomma atlanticum*
Proischnura subfurcata	*Tetrathemis camerunensis*	*Trithemis integra*	

AT0102: Atlantic Equatorial Coastal Forests (175 species, 1 769 records)

Species	Species	Species	Species
Aciagrion africanum	*Azuragrion buchholzi*	*Crocothemis erythraea*	*Hadrothemis camarensis*
Acisoma inflatum	*Brachythemis lacustris*	*Crocothemis sanguinolenta*	*Hadrothemis coacta*
Acisoma trifidum	*Bradinopyga strachani*	*Cyanothemis simpsoni*	*Hadrothemis defecta*
Aethiothemis basilewskyi	*Ceriagrion corallinum*	*Diastatomma bicolor*	*Hadrothemis infesta*
Aethriamanta rezia	*Ceriagrion glabrum*	*Diastatomma tricolor*	*Hadrothemis versuta*
Africallagma vaginale	*Ceriagrion platystigma*	*Diplacodes deminuta*	*Heliaeschna cynthiae*
Africocypha lacuselephantum	*Ceriagrion rubellocerinum*	*Diplacodes lefebvrii*	*Heliaeschna fuliginosa*
Afroaeschna scotias	*Ceriagrion tricrenaticeps*	*Diplacodes luminans*	*Heliaeschna ugandica*
Agriocnemis exilis	*Ceriagrion whellani*	*Elattoneura acuta*	*Hemistigma albipunctum*
Agriocnemis forcipata	*Chalcostephia flavifrons*	*Elattoneura balli*	*Ictinogomphus fraseri*
Agriocnemis maclachlani	*Chlorocypha aphrodite*	*Elattoneura josemorai*	*Idomacromia proavita*
Agriocnemis victoria	*Chlorocypha cancellata*	*Elattoneura lliba*	*Ischnura senegalensis*
Allocnemis contraria	*Chlorocypha curta*	*Elattoneura mayombensis*	*Lestes dissimulans*
Allocnemis cyanura	*Chlorocypha cyanifrons*	*Elattoneura pruinosa*	*Lestes tridens*
Allocnemis nigripes	*Chlorocypha glauca*	*Elattoneura vittata*	*Lestes uncifer*
Anax chloromelas	*Chlorocypha helenae*	*Gomphidia gamblesi*	*Libyogomphus tenaculatus*
Anax congoliath	*Chlorocypha neptunus*	*Gynacantha africana*	*Malgassophlebia bispina*
Anax imperator	*Chlorocypha rubida*	*Gynacantha bullata*	*Malgassophlebia westfalli*
Anax tristis	*Copera rufipes*	*Gynacantha cylindrata*	*Mesocnemis singularis*
Atoconeura luxata	*Crocothemis divisa*	*Gynacantha sextans*	*Micromacromia camerunica*

AT0102: Atlantic Equatorial Coastal Forests (*continued*)

Species	Species	Species	Species
Micromacromia zygoptera	*Oxythemis phoenicosceles*	*Pseudagrion grilloti*	*Trithemis aenea*
Neodythemis afra	*Palpopleura albifrons*	*Pseudagrion hamoni*	*Trithemis annulata*
Neodythemis klingi	*Palpopleura lucia*	*Pseudagrion hemicolon*	*Trithemis arteriosa*
Neodythemis preussi	*Palpopleura portia*	*Pseudagrion isidromorai*	*Trithemis dichroa*
Neodythemis takamandensis	*Pantala flavescens*	*Pseudagrion kibalense*	*Trithemis grouti*
Neophya rutherfordi	*Parazyxomma flavicans*	*Pseudagrion melanicterum*	*Trithemis hartwigi*
Neurogomphus alius	*Phaon camerunensis*	*Pseudagrion serrulatum*	*Trithemis imitata*
Neurogomphus fuscifrons	*Phaon iridipennis*	*Pseudagrion simonae*	*Trithemis kirbyi*
Neurolestes trinervis	*Phyllogomphus coloratus*	*Pseudagrion sjoestedti*	*Trithemis nuptialis*
Notiothemis robertsi	*Phyllomacromia aureozona*	*Pseudagrion sublacteum*	*Trithemis osvaldae*
Nubiolestes diotima	*Phyllomacromia caneri*	*Rhyothemis fenestrina*	*Trithemis pruinata*
Olpogastra lugubris	*Phyllomacromia contumax*	*Rhyothemis notata*	*Trithemis stictica*
Orthetrum abbotti	*Phyllomacromia insignis*	*Rhyothemis semihyalina*	*Trithemis tropicana*
Orthetrum africanum	*Phyllomacromia melania*	*Sapho bicolor*	*Trithetrum navasi*
Orthetrum austeni	*Phyllomacromia paula*	*Sapho gloriosa*	*Umma longistigma*
Orthetrum brachiale	*Platycypha rufitibia*	*Sapho orichalcea*	*Umma mesostigma*
Orthetrum chrysostigma	*Porpax asperipes*	*Stenocnemis pachystigma*	*Urothemis assignata*
Orthetrum guineense	*Porpax bipunctus*	*Stenocypha gracilis*	*Urothemis edwardsii*
Orthetrum hintzi	*Pseudagrion bernardi*	*Tetrathemis camerunensis*	*Zygonyx flavicosta*
Orthetrum icteromelas	*Pseudagrion camerunense*	*Thermochoria equivocata*	*Zygonyx regisalberti*
Orthetrum julia	*Pseudagrion epiphonematicum*	*Tholymis tillarga*	*Zygonyx speciosus*
Orthetrum microstigma	*Pseudagrion glaucescens*	*Tragogomphus ellioti*	*Zygonyx torridus*
Orthetrum saegeri	*Pseudagrion glaucoideum*	*Tramea basilaris*	*Zyxomma atlanticum*
Orthetrum stemmale	*Pseudagrion glaucum*	*Trithemis aconita*	

AT0103: Cameroonian Highlands Forest (105 species, 910 records)

Species	Species	Species	Species
Aethiothemis incongruens	*Azuragrion vansomereni*	*Elattoneura pruinosa*	*Neodythemis klingi*
Africocypha centripunctata	*Brachythemis impartita*	*Gomphidia gamblesi*	*Neurolestes nigeriensis*
Africocypha lacuselephantum	*Bradinopyga strachani*	*Gynacantha bullata*	*Neurolestes trinervis*
Afroaeschna scotias	*Ceriagrion glabrum*	*Hadrothemis coacta*	*Notiothemis robertsi*
Agriocnemis maclachlani	*Chalcostephia flavifrons*	*Heliaeschna cynthiae*	*Notogomphus maryae*
Allocnemis contraria	*Chlorocypha cancellata*	*Heliaeschna fuliginosa*	*Notogomphus moorei*
Allocnemis nigripes	*Chlorocypha curta*	*Ictinogomphus fraseri*	*Notogomphus spinosus*
Anax chloromelas	*Chlorocypha selysi*	*Idomacromia proavita*	*Nubiolestes diotima*
Anax congoliath	*Crocothemis erythraea*	*Ischnura senegalensis*	*Olpogastra lugubris*
Anax imperator	*Diastatomma bicolor*	*Libyogomphus tenaculatus*	*Orthetrum africanum*
Anax tristis	*Diastatomma tricolor*	*Mesocnemis singularis*	*Orthetrum austeni*
Atoconeura luxata	*Elattoneura balli*	*Micromacromia camerunica*	*Orthetrum brachiale*
Azuragrion buchholzi	*Elattoneura nigra*	*Neodythemis afra*	*Orthetrum caffrum*

AT0103: Cameroonian Highlands Forest (*continued*)

Species	Species	Species	Species
Orthetrum camerunense	*Phaon iridipennis*	*Pseudagrion glaucoideum*	*Trithemis dichroa*
Orthetrum guineense	*Phyllogomphus coloratus*	*Pseudagrion kersteni*	*Trithemis furva*
Orthetrum julia	*Phyllogomphus selysi*	*Pseudagrion melanicterum*	*Trithemis hartwigi*
Orthetrum microstigma	*Phyllomacromia bicristulata*	*Pseudagrion risi*	*Trithemis nuptialis*
Orthetrum stemmale	*Phyllomacromia caneri*	*Pseudagrion sjoestedti*	*Trithemis pruinata*
Orthetrum trinacria	*Phyllomacromia funicularioides*	*Sapho orichalcea*	*Trithemis stictica*
Oxythemis phoenicosceles	*Phyllomacromia lieftincki*	*Stenocnemis pachystigma*	*Umma longistigma*
Palpopleura deceptor	*Phyllomacromia melania*	*Stenocypha gracilis*	*Umma mesostigma*
Palpopleura lucia	*Porpax asperipes*	*Tetrathemis camerunensis*	*Umma mesumbei*
Palpopleura portia	*Porpax bipunctus*	*Tetrathemis godiardi*	*Zygonyx flavicosta*
Pantala flavescens	*Proischnura subfurcata*	*Tramea basilaris*	*Zygonyx speciosus*
Paragomphus abnormis	*Pseudagrion emarginatum*	*Trithemis aconita*	
Pentaphlebia stahli	*Pseudagrion epiphonematicum*	*Trithemis arteriosa*	
Phaon camerunensis	*Pseudagrion glaucescens*	*Trithemis basitincta*	

AT0104: Central Congolian Lowland Forests (49 species, 117 records)

Species	Species	Species	Species
Acisoma trifidum	*Gynacantha bullata*	*Palpopleura lucia*	*Trithemis apicalis*
Agriocnemis maclachlani	*Gynacantha cylindrata*	*Paragomphus nigroviridis*	*Trithemis dichroa*
Allocnemis nigripes	*Hadrothemis coacta*	*Phaon iridipennis*	*Trithemis nuptialis*
Allocnemis pauli	*Hadrothemis defecta*	*Phyllomacromia aureozona*	*Trithemis tropicana*
Allocnemis superba	*Hadrothemis infesta*	*Platycypha eliseva*	*Umma cincta*
Chalcostephia flavifrons	*Hadrothemis versuta*	*Porpax asperipes*	*Umma longistigma*
Chlorocypha cancellata	*Hemistigma albipunctum*	*Pseudagrion hageni*	*Umma saphirina*
Chlorocypha trifaria	*Malgassophlebia bispina*	*Pseudagrion kersteni*	*Zygonyx flavicosta*
Crocothemis erythraea	*Neodythemis klingi*	*Pseudagrion kibalense*	*Zygonyx regisalberti*
Crocothemis sanguinolenta	*Olpogastra lugubris*	*Rhyothemis notata*	*Zyxomma atlanticum*
Cyanothemis simpsoni	*Orthetrum austeni*	*Tetrathemis camerunensis*	
Elattoneura lliba	*Orthetrum julia*	*Thermochoria equivocata*	
Elattoneura vittata	*Orthetrum stemmale*	*Trithemis aenea*	

AT0106: Cross-Niger Transition Forests (12 species, 16 records)

Species	Species	Species	Species
Agriocnemis maclachlani	*Ceriagrion glabrum*	*Nesciothemis nigeriensis*	*Trithemis aenea*
Anax chloromelas	*Elattoneura nigra*	*Orthetrum abbotti*	*Trithetrum navasi*
Ceriagrion corallinum	*Elattoneura vittata*	*Pseudagrion glaucum*	*Zyxomma atlanticum*

AT0107: Cross-Sanaga-Bioko Coastal Forests (166 species, 1 490 records)

Species	Species	Species	Species
Aciagrion africanum	*Elattoneura nigra*	*Orthetrum camerunense*	*Pseudagrion serrulatum*
Acisoma inflatum	*Elattoneura pruinosa*	*Orthetrum chrysostigma*	*Pseudagrion sjoestedti*
Acisoma trifidum	*Elattoneura vittata*	*Orthetrum guineense*	*Pseudagrion sublacteum*
Aethiothemis incongruens	*Eleuthemis buettikoferi*	*Orthetrum julia*	*Sapho bicolor*
Africocypha lacuselephantum	*Gomphidia gamblesi*	*Orthetrum microstigma*	*Sapho gloriosa*
Agriocnemis maclachlani	*Gynacantha africana*	*Orthetrum saegeri*	*Sapho orichalcea*
Agriocnemis zerafica	*Gynacantha bullata*	*Orthetrum stemmale*	*Sapho puella*
Allocnemis contraria	*Gynacantha cylindrata*	*Oxythemis phoenicosceles*	*Stenocnemis pachystigma*
Allocnemis cyanura	*Gynacantha nigeriensis*	*Palpopleura deceptor*	*Stenocypha gracilis*
Allocnemis flavipennis	*Gynacantha sextans*	*Palpopleura lucia*	*Tetrathemis camerunensis*
Allocnemis nigripes	*Hadrothemis camarensis*	*Palpopleura portia*	*Tetrathemis godiardi*
Allocnemis subnodalis	*Hadrothemis coacta*	*Pantala flavescens*	*Thermochoria equivocata*
Anax congoliath	*Hadrothemis defecta*	*Paragomphus abnormis*	*Tholymis tillarga*
Anax ephippiger	*Hadrothemis infesta*	*Paragomphus genei*	*Tramea basilaris*
Anax imperator	*Hadrothemis versuta*	*Paragomphus nigroviridis*	*Trithemis aconita*
Anax tristis	*Heliaeschna cynthiae*	*Pentaphlebia stahli*	*Trithemis annulata*
Atoconeura luxata	*Heliaeschna fuliginosa*	*Phaon camerunensis*	*Trithemis arteriosa*
Azuragrion buchholzi	*Hemistigma albipunctum*	*Phaon iridipennis*	*Trithemis basitincta*
Bradinopyga strachani	*Ictinogomphus fraseri*	*Phyllogomphus coloratus*	*Trithemis bredoi*
Ceriagrion glabrum	*Idomacromia proavita*	*Phyllogomphus selysi*	*Trithemis dichroa*
Ceriagrion rubellocerinum	*Ischnura senegalensis*	*Phyllomacromia aeneothorax*	*Trithemis furva*
Chalcostephia flavifrons	*Libyogomphus mamfei*	*Phyllomacromia bicristulata*	*Trithemis grouti*
Chlorocypha cancellata	*Malgassophlebia bispina*	*Phyllomacromia caneri*	*Trithemis hartwigi*
Chlorocypha curta	*Mesocnemis singularis*	*Phyllomacromia contumax*	*Trithemis imitata*
Chlorocypha cyanifrons	*Micromacromia camerunica*	*Phyllomacromia funicularioides*	*Trithemis kalula*
Chlorocypha glauca	*Micromacromia zygoptera*	*Phyllomacromia hervei*	*Trithemis nuptialis*
Chlorocypha neptunus	*Neodythemis afra*	*Phyllomacromia lieftincki*	*Trithemis osvaldae*
Chlorocypha pyriformosa	*Neodythemis klingi*	*Phyllomacromia melania*	*Trithemis pruinata*
Chlorocypha rubida	*Neodythemis preussi*	*Phyllomacromia sophia*	*Trithemis stictica*
Chlorocypha selysi	*Neodythemis takamandensis*	*Platycypha lacustris*	*Trithemis tropicana*
Chlorocypha victoriae	*Nesciothemis pujoli*	*Platycypha rufitibia*	*Umma longistigma*
Copera sikassoensis	*Neurogomphus fuscifrons*	*Porpax asperipes*	*Umma mesostigma*
Crocothemis divisa	*Neurolestes nigeriensis*	*Porpax bipunctus*	*Umma mesumbei*
Crocothemis erythraea	*Neurolestes trinervis*	*Pseudagrion camerunense*	*Umma saphirina*
Crocothemis sanguinolenta	*Notiothemis robertsi*	*Pseudagrion epiphonematicum*	*Urothemis assignata*
Cyanothemis simpsoni	*Notogomphus moorei*	*Pseudagrion hamoni*	*Zygonyx flavicosta*
Diastatomma bicolor	*Notogomphus spinosus*	*Pseudagrion hemicolon*	*Zygonyx natalensis*
Diastatomma tricolor	*Nubiolestes diotima*	*Pseudagrion kersteni*	*Zygonyx speciosus*
Diplacodes lefebvrii	*Olpogastra lugubris*	*Pseudagrion kibalense*	*Zygonyx torridus*
Elattoneura acuta	*Orthetrum africanum*	*Pseudagrion melanicterum*	*Zyxomma atlanticum*
Elattoneura balli	*Orthetrum austeni*	*Pseudagrion nubicum*	
Elattoneura lindleyi	*Orthetrum brachiale*	*Pseudagrion risi*	

AT0108: East African Montane Forests (75 species, 268 records)

Species	Species	Species	Species
Africallagma elongatum	*Chalcostephia flavifrons*	*Orthetrum machadoi*	*Pseudagrion hageni*
Africallagma glaucum	*Crocothemis divisa*	*Orthetrum monardi*	*Pseudagrion hamoni*
Africallagma pseudelongatum	*Crocothemis sanguinolenta*	*Orthetrum stemmale*	*Pseudagrion kersteni*
Africallagma subtile	*Diplacodes luminans*	*Palpopleura deceptor*	*Pseudagrion lindicum*
Agriocnemis exilis	*Gynacantha villosa*	*Palpopleura jucunda*	*Pseudagrion salisburyense*
Allocnemis abbotti	*Hadrothemis camarensis*	*Palpopleura lucia*	*Pseudagrion spernatum*
Anax ephippiger	*Hemistigma albipunctum*	*Palpopleura portia*	*Pseudagrion torridum*
Anax imperator	*Ictinogomphus ferox*	*Pantala flavescens*	*Sympetrum fonscolombii*
Anax speratus	*Lestes plagiatus*	*Paragomphus alluaudi*	*Tetrathemis polleni*
Anax tristis	*Lestes tridens*	*Paragomphus genei*	*Tramea basilaris*
Atoconeura biordinata	*Lestes virgatus*	*Phyllomacromia monoceros*	*Trithemis arteriosa*
Atoconeura eudoxia	*Nesciothemis farinosa*	*Phyllomacromia picta*	*Trithemis furva*
Atoconeura kenya	*Notogomphus dorsalis*	*Pinheyschna meruensis*	*Trithemis kirbyi*
Azuragrion nigridorsum	*Notogomphus kilimandjaricus*	*Pinheyschna rileyi*	*Trithemis pluvialis*
Brachythemis lacustris	*Notogomphus maathaiae*	*Platycypha amboniensis*	*Umma saphirina*
Brachythemis leucosticta	*Orthetrum caffrum*	*Platycypha caligata*	*Zosteraeschna ellioti*
Bradinopyga cornuta	*Orthetrum camerunense*	*Platycypha lacustris*	*Zygonyx natalensis*
Bradinopyga strachani	*Orthetrum chrysostigma*	*Proischnura subfurcata*	*Zygonyx torridus*
Ceriagrion glabrum	*Orthetrum julia*	*Pseudagrion bicoerulans*	

AT0109: Eastern Arc Forests (97 species, 471 records)

Species	Species	Species	Species
Aciagrion gracile	*Coryphagrion grandis*	*Lestes plagiatus*	*Orthetrum stemmale*
Aethriamanta rezia	*Crenigomphus hartmanni*	*Lestes tridens*	*Orthetrum trinacria*
Africallagma elongatum	*Crocothemis divisa*	*Lestes virgatus*	*Palpopleura jucunda*
Agriocnemis exilis	*Crocothemis erythraea*	*Lestinogomphus angustus*	*Palpopleura lucia*
Agriocnemis gratiosa	*Crocothemis sanguinolenta*	*Mesocnemis singularis*	*Palpopleura portia*
Agriocnemis pinheyi	*Diplacodes pumila*	*Microgomphus nyassicus*	*Pantala flavescens*
Allocnemis abbotti	*Elattoneura cellularis*	*Nepogomphoides stuhlmanni*	*Paragomphus alluaudi*
Amanipodagrion gilliesi	*Elattoneura glauca*	*Nesciothemis farinosa*	*Paragomphus cognatus*
Anaciaeschna triangulifera	*Eleuthemis quadrigutta*	*Notiothemis jonesi*	*Paragomphus magnus*
Anax imperator	*Gomphidia quarrei*	*Notogomphus dendrohyrax*	*Phaon iridipennis*
Anax speratus	*Gynacantha manderica*	*Orthetrum abbotti*	*Phyllogomphus selysi*
Atoconeura biordinata	*Gynacantha usambarica*	*Orthetrum brachiale*	*Phyllomacromia monoceros*
Azuragrion nigridorsum	*Gynacantha villosa*	*Orthetrum caffrum*	*Phyllomacromia picta*
Brachythemis lacustris	*Hadrothemis scabrifrons*	*Orthetrum chrysostigma*	*Pinheyschna rileyi*
Bradinopyga cornuta	*Hemistigma albipunctum*	*Orthetrum hintzi*	*Platycypha auripes*
Ceriagrion glabrum	*Ictinogomphus ferox*	*Orthetrum icteromelas*	*Platycypha caligata*
Ceriagrion suave	*Ischnura senegalensis*	*Orthetrum julia*	*Proischnura subfurcata*
Chalcostephia flavifrons	*Lestes pinheyi*	*Orthetrum machadoi*	*Pseudagrion commoniae*

AT0109: Eastern Arc Forests (*continued*)

Species	Species	Species	Species
Pseudagrion hageni	*Pseudagrion sublacteum*	*Trithemis dorsalis*	*Zosteraeschna usambarica*
Pseudagrion hamoni	*Tetrathemis polleni*	*Trithemis furva*	*Zygonoides fuelleborni*
Pseudagrion kersteni	*Thermochoria jeanneli*	*Trithemis integra*	*Zygonyx natalensis*
Pseudagrion massaicum	*Trithemis aconita*	*Trithemis pluvialis*	*Zygonyx torridus*
Pseudagrion salisburyense	*Trithemis arteriosa*	*Trithemis stictica*	
Pseudagrion sjoestedti	*Trithemis bifida*	*Umma declivium*	
Pseudagrion spernatum	*Trithemis donaldsoni*	*Urothemis assignata*	

AT0110: Eastern Congolian Swamp Forests (132 species, 782 records)

Species	Species	Species	Species
Aciagrion brosseti	*Diplacodes lefebvrii*	*Nesciothemis farinosa*	*Phyllomacromia contumax*
Acisoma trifidum	*Diplacodes luminans*	*Neurogomphus martininus*	*Phyllomacromia maesi*
Aethiothemis erythromelas	*Elattoneura centrafricana*	*Neurogomphus uelensis*	*Phyllomacromia paula*
Aethriamanta rezia	*Elattoneura lliba*	*Notiothemis robertsi*	*Platycypha eliseva*
Agriocnemis forcipata	*Elattoneura morini*	*Olpogastra lugubris*	*Porpax asperipes*
Agriocnemis maclachlani	*Elattoneura vittata*	*Orthetrum abbotti*	*Porpax garambensis*
Agriocnemis stygia	*Elattoneura vrijdaghi*	*Orthetrum africanum*	*Pseudagrion glaucum*
Agriocnemis victoria	*Gomphidia quarrei*	*Orthetrum austeni*	*Pseudagrion kibalense*
Allocnemis cyanura	*Gynacantha africana*	*Orthetrum brachiale*	*Pseudagrion melanicterum*
Allocnemis nigripes	*Gynacantha bullata*	*Orthetrum hintzi*	*Pseudagrion nubicum*
Anax imperator	*Gynacantha cylindrata*	*Orthetrum icteromelas*	*Pseudagrion serrulatum*
Anax speratus	*Gynacantha sextans*	*Orthetrum julia*	*Pseudagrion simplicilaminatum*
Anax tristis	*Hadrothemis camarensis*	*Orthetrum microstigma*	*Pseudagrion thenartum*
Brachythemis lacustris	*Hadrothemis coacta*	*Orthetrum saegeri*	*Pseudagrion torridum*
Brachythemis leucosticta	*Hadrothemis defecta*	*Orthetrum stemmale*	*Rhyothemis fenestrina*
Ceriagrion corallinum	*Hadrothemis infesta*	*Orthetrum trinacria*	*Rhyothemis notata*
Ceriagrion glabrum	*Hadrothemis versuta*	*Oxythemis phoenicosceles*	*Rhyothemis semihyalina*
Ceriagrion ignitum	*Hadrothemis vrijdaghi*	*Palpopleura albifrons*	*Sapho orichalcea*
Ceriagrion varians	*Heliaeschna cynthiae*	*Palpopleura lucia*	*Tetrathemis camerunensis*
Ceriagrion whellani	*Heliaeschna fuliginosa*	*Palpopleura portia*	*Thermochoria equivocata*
Chalcostephia flavifrons	*Heliaeschna sembe*	*Pantala flavescens*	*Tholymis tillarga*
Chlorocypha aphrodite	*Hemistigma albipunctum*	*Paragomphus acuminatus*	*Trithemis aenea*
Chlorocypha pyriformosa	*Ictinogomphus regisalberti*	*Paragomphus nigroviridis*	*Trithemis annulata*
Chlorocypha trifaria	*Lestes dissimulans*	*Parazyxomma flavicans*	*Trithemis apicalis*
Copera nyansana	*Libyogomphus tenaculatus*	*Phaon camerunensis*	*Trithemis arteriosa*
Crocothemis erythraea	*Malgassophlebia bispina*	*Phaon iridipennis*	*Trithemis congolica*
Cyanothemis simpsoni	*Micromacromia camerunica*	*Phyllogomphus annulus*	*Trithemis dichroa*
Diastatomma multilineatum	*Neodythemis klingi*	*Phyllogomphus coloratus*	*Trithemis grouti*
Diastatomma selysi	*Neodythemis preussi*	*Phyllogomphus selysi*	*Trithemis longistyla*
Diplacodes deminuta	*Neophya rutherfordi*	*Phyllomacromia aureozona*	*Trithemis nuptialis*

AT0110: Eastern Congolian Swamp Forests (*continued*)

Species	Species	Species	Species
Trithemis tropicana	*Umma cincta*	*Urothemis assignata*	*Zygonyx flavicosta*
Trithetrum congoense	*Umma longistigma*	*Urothemis edwardsii*	*Zygonyx regisalberti*
Trithetrum navasi	*Umma saphirina*	*Zygonoides occidentis*	*Zyxomma atlanticum*

AT0111: Eastern Guinean Forests (163 species, 1 759 records)

Species	Species	Species	Species
Aciagrion africanum	*Chlorocypha selysi*	*Ictinogomphus fraseri*	*Pantala flavescens*
Aciagrion gracile	*Copera guttifera*	*Ischnura senegalensis*	*Paragomphus genei*
Acisoma inflatum	*Copera sikassoensis*	*Lestes dissimulans*	*Paragomphus nigroviridis*
Acisoma trifidum	*Crenigomphus renei*	*Lestes ictericus*	*Paragomphus serrulatus*
Aethiothemis incongruens	*Crocothemis divisa*	*Lestes ochraceus*	*Parazyxomma flavicans*
Aethriamanta rezia	*Crocothemis erythraea*	*Lestes tridens*	*Phaon camerunensis*
Africallagma vaginale	*Crocothemis sanguinolenta*	*Lestinogomphus matilei*	*Phaon iridipennis*
Agriocnemis exilis	*Cyanothemis simpsoni*	*Mesocnemis robusta*	*Phyllogomphus aethiops*
Agriocnemis maclachlani	*Diastatomma bicolor*	*Mesocnemis singularis*	*Phyllogomphus moundi*
Agriocnemis zerafica	*Diastatomma gamblesi*	*Micromacromia zygoptera*	*Phyllomacromia hervei*
Allocnemis elongata	*Diplacodes lefebvrii*	*Neodythemis klingi*	*Phyllomacromia melania*
Allocnemis flavipennis	*Diplacodes luminans*	*Neophya rutherfordi*	*Phyllomacromia sophia*
Allocnemis subnodalis	*Elattoneura balli*	*Nesciothemis minor*	*Pseudagrion camerunense*
Anax ephippiger	*Elattoneura girardi*	*Nesciothemis pujoli*	*Pseudagrion epiphonematicum*
Anax imperator	*Elattoneura glauca*	*Notiothemis robertsi*	*Pseudagrion gigas*
Anax tristis	*Elattoneura nigra*	*Olpogastra lugubris*	*Pseudagrion glaucescens*
Atoconeura luxata	*Elattoneura villiersi*	*Orthetrum abbotti*	*Pseudagrion glaucoideum*
Azuragrion vansomereni	*Eleuthemis buettikoferi*	*Orthetrum africanum*	*Pseudagrion glaucum*
Brachythemis lacustris	*Gomphidia gamblesi*	*Orthetrum angustiventre*	*Pseudagrion hamoni*
Brachythemis leucosticta	*Gynacantha africana*	*Orthetrum austeni*	*Pseudagrion hemicolon*
Bradinopyga strachani	*Gynacantha bullata*	*Orthetrum brachiale*	*Pseudagrion kersteni*
Ceriagrion bakeri	*Gynacantha cylindrata*	*Orthetrum chrysostigma*	*Pseudagrion malagasoides*
Ceriagrion corallinum	*Gynacantha manderica*	*Orthetrum guineense*	*Pseudagrion melanicterum*
Ceriagrion glabrum	*Gynacantha nigeriensis*	*Orthetrum hintzi*	*Pseudagrion nubicum*
Ceriagrion ignitum	*Gynacantha sextans*	*Orthetrum icteromelas*	*Pseudagrion sjoestedti*
Ceriagrion rubellocerinum	*Gynacantha vesiculata*	*Orthetrum julia*	*Pseudagrion sublacteum*
Ceriagrion whellani	*Hadrothemis camarensis*	*Orthetrum microstigma*	*Pseudagrion torridum*
Chalcostephia flavifrons	*Hadrothemis coacta*	*Orthetrum saegeri*	*Rhyothemis fenestrina*
Chlorocypha curta	*Hadrothemis defecta*	*Orthetrum stemmale*	*Rhyothemis notata*
Chlorocypha dispar	*Hadrothemis infesta*	*Orthetrum trinacria*	*Rhyothemis semihyalina*
Chlorocypha luminosa	*Hadrothemis versuta*	*Oxythemis phoenicosceles*	*Sapho bicolor*
Chlorocypha pyriformosa	*Heliaeschna fuliginosa*	*Palpopleura deceptor*	*Sapho ciliata*
Chlorocypha radix	*Hemistigma albipunctum*	*Palpopleura lucia*	*Tetrathemis camerunensis*
Chlorocypha rubida	*Ictinogomphus ferox*	*Palpopleura portia*	*Tetrathemis godiardi*

AT0111: Eastern Guinean Forests (*continued*)

Species	Species	Species	Species
Thermochoria equivocata	*Trithemis annulata*	*Trithemis grouti*	*Urothemis edwardsii*
Tholymis tillarga	*Trithemis arteriosa*	*Trithemis imitata*	*Zygonyx chrysobaphes*
Tramea basilaris	*Trithemis basitincta*	*Trithemis kalula*	*Zygonyx flavicosta*
Tramea limbata	*Trithemis bifida*	*Trithemis pruinata*	*Zygonyx natalensis*
Trithemis aconita	*Trithemis bredoi*	*Trithetrum navasi*	*Zygonyx torridus*
Trithemis aenea	*Trithemis dejouxi*	*Umma cincta*	*Zyxomma atlanticum*
Trithemis africana	*Trithemis dichroa*	*Urothemis assignata*	

AT0112: Ethiopian Montane Forests (77 species, 306 records)

Species	Species	Species	Species
Acisoma inflatum	*Ictinogomphus ferox*	*Palpopleura deceptor*	*Pseudagrion niloticum*
Africallagma elongatum	*Ischnura abyssinica*	*Palpopleura jucunda*	*Pseudagrion nubicum*
Africallagma subtile	*Ischnura senegalensis*	*Palpopleura lucia*	*Pseudagrion spernatum*
Agriocnemis inversa	*Lestes pallidus*	*Palpopleura portia*	*Pseudagrion sublacteum*
Agriocnemis sania	*Lestes virgatus*	*Pantala flavescens*	*Rhyothemis semihyalina*
Anaciaeschna triangulifera	*Nesciothemis farinosa*	*Paragomphus alluaudi*	*Sympetrum fonscolombii*
Anax ephippiger	*Notogomphus cottarellii*	*Paragomphus crenigomphoides*	*Trithemis aconita*
Anax imperator	*Notogomphus dorsalis*	*Paragomphus sinaiticus*	*Trithemis annulata*
Anax speratus	*Notogomphus lecythus*	*Phaon iridipennis*	*Trithemis arteriosa*
Atoconeura aethiopica	*Notogomphus ruppeli*	*Phyllomacromia picta*	*Trithemis dejouxi*
Brachythemis leucosticta	*Orthetrum abbotti*	*Pinheyschna waterstoni*	*Trithemis ellenbeckii*
Bradinopyga strachani	*Orthetrum brachiale*	*Platycypha caligata*	*Trithemis furva*
Ceriagrion glabrum	*Orthetrum caffrum*	*Proischnura subfurcata*	*Trithemis kirbyi*
Chalcostephia flavifrons	*Orthetrum chrysostigma*	*Pseudagrion commoniae*	*Trithemis stictica*
Crocothemis erythraea	*Orthetrum guineense*	*Pseudagrion gamblesi*	*Urothemis assignata*
Crocothemis sanguinolenta	*Orthetrum hintzi*	*Pseudagrion guichardi*	*Zygonyx natalensis*
Diplacodes lefebvrii	*Orthetrum julia*	*Pseudagrion hamoni*	*Zygonyx torridus*
Elattoneura pasquinii	*Orthetrum kristenseni*	*Pseudagrion kaffinum*	
Gynacantha nigeriensis	*Orthetrum stemmale*	*Pseudagrion kersteni*	
Gynacantha vesiculata	*Orthetrum trinacria*	*Pseudagrion massaicum*	

AT0114: Guinean Montane Forests (147 species, 1 760 records)

Species	Species	Species	Species
Aciagrion africanum	*Aethriamanta rezia*	*Allocnemis elongata*	*Anax rutherfordi*
Acisoma inflatum	*Africallagma subtile*	*Allocnemis flavipennis*	*Anax tristis*
Acisoma trifidum	*Agriocnemis exilis*	*Allocnemis subnodalis*	*Atoconeura luxata*
Aethiothemis bella	*Agriocnemis maclachlani*	*Anax chloromelas*	*Azuragrion vansomereni*
Aethiothemis solitaria	*Agriocnemis victoria*	*Anax imperator*	*Bradinopyga strachani*

AT0114: Guinean Montane Forests (*continued*)

Species	Species	Species	Species
Ceriagrion bakeri	*Gynacantha nigeriensis*	*Orthetrum guineense*	*Pseudagrion melanicterum*
Ceriagrion corallinum	*Gynacantha vesiculata*	*Orthetrum hintzi*	*Pseudagrion sjoestedti*
Ceriagrion glabrum	*Hadrothemis camarensis*	*Orthetrum icteromelas*	*Rhyothemis fenestrina*
Ceriagrion rubellocerinum	*Hadrothemis coacta*	*Orthetrum julia*	*Rhyothemis notata*
Ceriagrion suave	*Hadrothemis defecta*	*Orthetrum latihami*	*Rhyothemis semihyalina*
Ceriagrion whellani	*Hadrothemis infesta*	*Orthetrum microstigma*	*Sapho bicolor*
Chalcostephia flavifrons	*Hadrothemis versuta*	*Orthetrum monardi*	*Sapho ciliata*
Chlorocypha curta	*Heliaeschna fuliginosa*	*Orthetrum saegeri*	*Sapho fumosa*
Chlorocypha dispar	*Heliaeschna sembe*	*Orthetrum stemmale*	*Tetrathemis camerunensis*
Chlorocypha luminosa	*Hemistigma albipunctum*	*Orthetrum trinacria*	*Tetrathemis godiardi*
Chlorocypha pyriformosa	*Ictinogomphus ferox*	*Palpopleura deceptor*	*Thermochoria equivocata*
Chlorocypha radix	*Idomacromia proavita*	*Palpopleura lucia*	*Tholymis tillarga*
Chlorocypha rubida	*Lestes dissimulans*	*Palpopleura portia*	*Tramea basilaris*
Chlorocypha selysi	*Lestes tridens*	*Pantala flavescens*	*Tramea limbata*
Copera guttifera	*Libyogomphus christinae*	*Paragomphus serrulatus*	*Trithemis aconita*
Copera sikassoensis	*Malgassophlebia bispina*	*Paragomphus tournieri*	*Trithemis annulata*
Cornigomphus mariannae	*Mesocnemis singularis*	*Parazyxomma flavicans*	*Trithemis arteriosa*
Crocothemis divisa	*Micromacromia camerunica*	*Phaon iridipennis*	*Trithemis dichroa*
Crocothemis erythraea	*Micromacromia zygoptera*	*Phyllogomphus moundi*	*Trithemis grouti*
Crocothemis sanguinolenta	*Neodythemis campioni*	*Phyllomacromia aeneothorax*	*Trithemis imitata*
Cyanothemis simpsoni	*Neodythemis klingi*	*Phyllomacromia contumax*	*Trithemis kalula*
Diastatomma gamblesi	*Neophya rutherfordi*	*Phyllomacromia hervei*	*Trithemis pruinata*
Diplacodes lefebvrii	*Nesciothemis minor*	*Phyllomacromia sophia*	*Trithetrum navasi*
Elattoneura balli	*Nesciothemis nigeriensis*	*Porpax bipunctus*	*Umma cincta*
Elattoneura girardi	*Nesciothemis pujoli*	*Pseudagrion camerunense*	*Urothemis edwardsii*
Elattoneura nigra	*Notiothemis robertsi*	*Pseudagrion epiphonematicum*	*Zygonyx chrysobaphes*
Elattoneura villiersi	*Olpogastra lugubris*	*Pseudagrion gigas*	*Zygonyx flavicosta*
Eleuthemis buettikoferi	*Orthetrum abbotti*	*Pseudagrion glaucescens*	*Zygonyx geminuncus*
Gomphidia gamblesi	*Orthetrum africanum*	*Pseudagrion hamoni*	*Zygonyx natalensis*
Gynacantha bullata	*Orthetrum austeni*	*Pseudagrion hemicolon*	*Zygonyx torridus*
Gynacantha cylindrata	*Orthetrum brachiale*	*Pseudagrion isidromorai*	*Zyxomma atlanticum*
Gynacantha manderica	*Orthetrum chrysostigma*	*Pseudagrion kersteni*	

AT0115: Knysna-Amatole Montane Forests (43 species, 610 records)

Species	Species	Species	Species
Africallagma glaucum	*Ceratogomphus triceraticus*	*Chlorolestes tessellatus*	*Elattoneura frenulata*
Allocnemis leucosticta	*Ceriagrion glabrum*	*Chlorolestes umbratus*	*Ischnura senegalensis*
Anax imperator	*Chlorolestes apricans*	*Crocothemis erythraea*	*Lestes plagiatus*
Anax speratus	*Chlorolestes conspicuus*	*Diplacodes lefebvrii*	*Lestes virgatus*
Azuragrion nigridorsum	*Chlorolestes fasciatus*	*Ecchlorolestes nylephtha*	*Nesciothemis farinosa*

AT0115: Knysna-Amatole Montane Forests (*continued*)

Species	Species	Species	Species
Orthetrum caffrum	*Platycypha fitzsimonsi*	*Pseudagrion massaicum*	*Tramea limbata*
Orthetrum chrysostigma	*Pseudagrion caffrum*	*Pseudagrion salisburyense*	*Trithemis arteriosa*
Orthetrum julia	*Pseudagrion draconis*	*Sympetrum fonscolombii*	*Trithemis furva*
Palpopleura jucunda	*Pseudagrion furcigerum*	*Syncordulia gracilis*	*Trithemis stictica*
Pantala flavescens	*Pseudagrion hageni*	*Syncordulia venator*	*Zosteraeschna minuscula*
Pinheyschna subpupillata	*Pseudagrion kersteni*	*Tetrathemis polleni*	

AT0116: Kwazulu-Cape Coastal Forests Mosaic (100 species, 1 555 records)

Species	Species	Species	Species
Acisoma variegatum	*Elattoneura glauca*	*Orthetrum robustum*	*Pseudagrion salisburyense*
Aethriamanta rezia	*Gynacantha manderica*	*Orthetrum stemmale*	*Pseudagrion spernatum*
Africallagma fractum	*Gynacantha usambarica*	*Orthetrum trinacria*	*Pseudagrion sublacteum*
Africallagma glaucum	*Gynacantha villosa*	*Palpopleura jucunda*	*Pseudagrion sudanicum*
Agriocnemis falcifera	*Hemicordulia africana*	*Palpopleura lucia*	*Rhyothemis semihyalina*
Agriocnemis gratiosa	*Hemistigma albipunctum*	*Palpopleura portia*	*Sympetrum fonscolombii*
Allocnemis leucosticta	*Ictinogomphus ferox*	*Pantala flavescens*	*Tetrathemis polleni*
Anaciaeschna triangulifera	*Ischnura senegalensis*	*Paragomphus cognatus*	*Tramea basilaris*
Anax ephippiger	*Lestes pallidus*	*Paragomphus genei*	*Tramea limbata*
Anax imperator	*Lestes plagiatus*	*Paragomphus sabicus*	*Trithemis aconita*
Anax speratus	*Lestes tridens*	*Parazyxomma flavicans*	*Trithemis annulata*
Anax tristis	*Lestes virgatus*	*Phaon iridipennis*	*Trithemis arteriosa*
Azuragrion nigridorsum	*Lestinogomphus angustus*	*Phyllomacromia contumax*	*Trithemis donaldsoni*
Brachythemis leucosticta	*Metacnemis valida*	*Phyllomacromia picta*	*Trithemis furva*
Bradinopyga cornuta	*Nesciothemis farinosa*	*Pinheyschna subpupillata*	*Trithemis hecate*
Ceratogomphus pictus	*Notiothemis jonesi*	*Platycypha caligata*	*Trithemis kirbyi*
Ceriagrion glabrum	*Notogomphus praetorius*	*Platycypha fitzsimonsi*	*Trithemis pluvialis*
Chalcostephia flavifrons	*Onychogomphus supinus*	*Pseudagrion acaciae*	*Trithemis stictica*
Chlorolestes fasciatus	*Orthetrum abbotti*	*Pseudagrion citricola*	*Urothemis assignata*
Chlorolestes tessellatus	*Orthetrum caffrum*	*Pseudagrion coeleste*	*Urothemis edwardsii*
Crenigomphus hartmanni	*Orthetrum chrysostigma*	*Pseudagrion commoniae*	*Urothemis luciana*
Crocothemis erythraea	*Orthetrum hintzi*	*Pseudagrion hageni*	*Zosteraeschna minuscula*
Crocothemis sanguinolenta	*Orthetrum icteromelas*	*Pseudagrion hamoni*	*Zygonyx natalensis*
Diplacodes lefebvrii	*Orthetrum julia*	*Pseudagrion kersteni*	*Zygonyx torridus*
Diplacodes luminans	*Orthetrum machadoi*	*Pseudagrion massaicum*	*Zyxomma atlanticum*

AT0119: Maputaland Coastal Forests Mosaic (109 species, 1 847 records)

Species	Species	Species	Species
Aciagrion dondoense	*Acisoma variegatum*	*Africallagma glaucum*	*Agriocnemis exilis*
Aciagrion gracile	*Aethriamanta rezia*	*Africallagma subtile*	*Agriocnemis falcifera*

AT0119: Maputaland Coastal Forests Mosaic (*continued*)

Species	Species	Species	Species
Agriocnemis gratiosa	*Hemicordulia africana*	*Orthetrum monardi*	*Pseudagrion sublacteum*
Agriocnemis ruberrima	*Hemistigma albipunctum*	*Orthetrum robustum*	*Rhyothemis semihyalina*
Anaciaeschna triangulifera	*Ictinogomphus ferox*	*Orthetrum stemmale*	*Sympetrum fonscolombii*
Anax ephippiger	*Ischnura senegalensis*	*Orthetrum trinacria*	*Tetrathemis polleni*
Anax imperator	*Lestes dissimulans*	*Palpopleura deceptor*	*Tholymis tillarga*
Anax speratus	*Lestes ictericus*	*Palpopleura jucunda*	*Tramea basilaris*
Anax tristis	*Lestes pallidus*	*Palpopleura lucia*	*Tramea limbata*
Azuragrion nigridorsum	*Lestes plagiatus*	*Palpopleura portia*	*Trithemis aconita*
Brachythemis lacustris	*Lestes tridens*	*Pantala flavescens*	*Trithemis annulata*
Brachythemis leucosticta	*Lestes uncifer*	*Paragomphus cognatus*	*Trithemis arteriosa*
Bradinopyga cornuta	*Lestes virgatus*	*Paragomphus elpidius*	*Trithemis furva*
Ceratogomphus pictus	*Macrodiplax cora*	*Paragomphus genei*	*Trithemis hecate*
Ceriagrion glabrum	*Mesocnemis singularis*	*Parazyxomma flavicans*	*Trithemis kirbyi*
Ceriagrion suave	*Nesciothemis farinosa*	*Phaon iridipennis*	*Trithemis pluvialis*
Chalcostephia flavifrons	*Neurogomphus zambeziensis*	*Phyllomacromia contumax*	*Trithemis stictica*
Chlorolestes fasciatus	*Notiothemis jonesi*	*Phyllomacromia picta*	*Trithemis werneri*
Crocothemis erythraea	*Notogomphus praetorius*	*Pinheyschna subpupillata*	*Urothemis assignata*
Crocothemis sanguinolenta	*Olpogastra lugubris*	*Platycypha caligata*	*Urothemis edwardsii*
Diplacodes lefebvrii	*Orthetrum abbotti*	*Pseudagrion acaciae*	*Urothemis luciana*
Diplacodes luminans	*Orthetrum brachiale*	*Pseudagrion coeleste*	*Zosteraeschna minuscula*
Diplacodes pumila	*Orthetrum caffrum*	*Pseudagrion commoniae*	*Zygonyx natalensis*
Elattoneura glauca	*Orthetrum chrysostigma*	*Pseudagrion hageni*	*Zygonyx torridus*
Gomphidia quarrei	*Orthetrum hintzi*	*Pseudagrion hamoni*	*Zyxomma atlanticum*
Gynacantha manderica	*Orthetrum icteromelas*	*Pseudagrion kersteni*	
Gynacantha usambarica	*Orthetrum julia*	*Pseudagrion massaicum*	
Gynacantha villosa	*Orthetrum machadoi*	*Pseudagrion salisburyense*	

AT0121: Mount Cameroon and Bioko Montane Forests (22 species, 32 records)

Species	Species	Species	Species
Allocnemis contraria	*Elattoneura vittata*	*Pentaphlebia stahli*	*Thermochoria equivocata*
Chlorocypha cancellata	*Gynacantha bullata*	*Phyllomacromia paula*	*Trithemis dichroa*
Chlorocypha glauca	*Gynacantha sextans*	*Pseudagrion epiphonematicum*	*Trithemis kalula*
Chlorocypha neptunus	*Hadrothemis camarensis*	*Pseudagrion serrulatum*	*Umma mesostigma*
Chlorocypha selysi	*Heliaeschna fuliginosa*	*Pseudagrion sjoestedti*	
Elattoneura pruinosa	*Neodythemis klingi*	*Sapho orichalcea*	

AT0122: Niger Delta Swamp Forests (34 species, 142 records)

Species	Species	Species	Species
Acisoma trifidum	*Hadrothemis camarensis*	*Orthetrum chrysostigma*	*Thermochoria equivocata*
Aethriamanta rezia	*Hadrothemis coacta*	*Orthetrum julia*	*Tholymis tillarga*
Agriocnemis maclachlani	*Hadrothemis infesta*	*Orthetrum stemmale*	*Trithemis grouti*
Ceriagrion glabrum	*Hadrothemis versuta*	*Palpopleura lucia*	*Trithemis tropicana*
Ceriagrion tricrenaticeps	*Heliaeschna fuliginosa*	*Palpopleura portia*	*Urothemis assignata*
Chalcostephia flavifrons	*Hemistigma albipunctum*	*Pantala flavescens*	*Zygonyx torridus*
Chlorocypha pyriformosa	*Lestes dissimulans*	*Phaon iridipennis*	*Zyxomma atlanticum*
Crocothemis erythraea	*Neodythemis preussi*	*Phyllomacromia hervei*	
Diplacodes lefebvrii	*Orthetrum austeni*	*Rhyothemis notata*	

AT0123: Nigerian Lowland Forests (86 species, 208 records)

Species	Species	Species	Species
Acisoma trifidum	*Cyanothemis simpsoni*	*Orthetrum chrysostigma*	*Rhyothemis fenestrina*
Aethriamanta rezia	*Diplacodes lefebvrii*	*Orthetrum guineense*	*Rhyothemis notata*
Agriocnemis maclachlani	*Elattoneura girardi*	*Orthetrum hintzi*	*Sapho ciliata*
Agriocnemis zerafica	*Eleuthemis buettikoferi*	*Orthetrum julia*	*Tetrathemis camerunensis*
Allocnemis elongata	*Gynacantha bullata*	*Orthetrum microstigma*	*Thermochoria equivocata*
Allocnemis flavipennis	*Gynacantha manderica*	*Orthetrum stemmale*	*Tholymis tillarga*
Azuragrion vansomereni	*Gynacantha nigeriensis*	*Oxythemis phoenicosceles*	*Tramea basilaris*
Bradinopyga strachani	*Gynacantha sextans*	*Palpopleura lucia*	*Trithemis aconita*
Ceriagrion corallinum	*Hadrothemis camarensis*	*Palpopleura portia*	*Trithemis annulata*
Ceriagrion glabrum	*Hadrothemis infesta*	*Pantala flavescens*	*Trithemis arteriosa*
Ceriagrion platystigma	*Hadrothemis versuta*	*Phaon camerunensis*	*Trithemis bredoi*
Ceriagrion rubellocerinum	*Heliaeschna fuliginosa*	*Phaon iridipennis*	*Trithemis dichroa*
Chalcostephia flavifrons	*Heliaeschna sembe*	*Phyllogomphus moundi*	*Trithemis grouti*
Chlorocypha curta	*Hemistigma albipunctum*	*Pseudagrion glaucescens*	*Trithemis imitata*
Chlorocypha dispar	*Lestes dissimulans*	*Pseudagrion glaucoideum*	*Trithemis kalula*
Chlorocypha pyriformosa	*Mesocnemis singularis*	*Pseudagrion hamoni*	*Trithemis kirbyi*
Chlorocypha radix	*Neodythemis klingi*	*Pseudagrion hemicolon*	*Umma cincta*
Chlorocypha rubida	*Nesciothemis minor*	*Pseudagrion isidromorai*	*Umma longistigma*
Chlorocypha selysi	*Nesciothemis pujoli*	*Pseudagrion kersteni*	*Urothemis assignata*
Copera guttifera	*Orthetrum abbotti*	*Pseudagrion melanicterum*	*Zygonyx flavicosta*
Copera sikassoensis	*Orthetrum austeni*	*Pseudagrion sjoestedti*	
Crocothemis divisa	*Orthetrum brachiale*	*Pseudagrion sublacteum*	

AT0124: Northeastern Congolian Lowland Forests (157 species, 672 records)

Species	Species	Species	Species
Aciagrion brosseti	*Aethiothemis basilewskyi*	*Aethriamanta rezia*	*Agriocnemis forcipata*
Acisoma trifidum	*Aethiothemis erythromelas*	*Africallagma pseudelongatum*	*Agriocnemis maclachlani*

AT0124: Northeastern Congolian Lowland Forests (*continued*)

Species	Species	Species	Species
Agriocnemis stygia	*Elattoneura lliba*	*Orthetrum microstigma*	*Pseudagrion thenartum*
Agriocnemis victoria	*Elattoneura vittata*	*Orthetrum saegeri*	*Rhyothemis fenestrina*
Allocnemis cyanura	*Elattoneura vrijdaghi*	*Orthetrum stemmale*	*Rhyothemis notata*
Allocnemis nigripes	*Gomphidia bredoi*	*Oxythemis phoenicosceles*	*Rhyothemis semihyalina*
Allocnemis superba	*Gomphidia quarrei*	*Palpopleura deceptor*	*Stenocypha molindica*
Anax congoliath	*Gynacantha africana*	*Palpopleura lucia*	*Tetrathemis camerunensis*
Anax ephippiger	*Gynacantha bullata*	*Palpopleura portia*	*Thermochoria equivocata*
Anax imperator	*Gynacantha cylindrata*	*Pantala flavescens*	*Tholymis tillarga*
Anax speratus	*Gynacantha sextans*	*Paragomphus acuminatus*	*Tramea basilaris*
Atoconeura pseudeudoxia	*Gynacantha villosa*	*Paragomphus genei*	*Trithemis aenea*
Brachythemis lacustris	*Hadrothemis camarensis*	*Paragomphus viridior*	*Trithemis arteriosa*
Brachythemis leucosticta	*Hadrothemis coacta*	*Parazyxomma flavicans*	*Trithemis bredoi*
Bradinopyga strachani	*Hadrothemis defecta*	*Phaon camerunensis*	*Trithemis congolica*
Ceriagrion annulatum	*Hadrothemis infesta*	*Phaon iridipennis*	*Trithemis dichroa*
Ceriagrion corallinum	*Hadrothemis versuta*	*Phyllogomphus annulus*	*Trithemis grouti*
Ceriagrion glabrum	*Heliaeschna fuliginosa*	*Phyllomacromia aureozona*	*Trithemis hartwigi*
Ceriagrion platystigma	*Hemistigma albipunctum*	*Phyllomacromia contumax*	*Trithemis imitata*
Ceriagrion tricrenaticeps	*Ictinogomphus ferox*	*Phyllomacromia picta*	*Trithemis integra*
Ceriagrion varians	*Ictinogomphus regisalberti*	*Platycypha lacustris*	*Trithemis longistyla*
Ceriagrion whellani	*Lestinogomphus angustus*	*Platycypha picta*	*Trithemis nuptialis*
Chalcostephia flavifrons	*Lestinogomphus congoensis*	*Porpax asperipes*	*Trithemis pruinata*
Chlorocypha aphrodite	*Malgassophlebia bispina*	*Porpax garambensis*	*Trithemis stictica*
Chlorocypha cancellata	*Mesocnemis saralisa*	*Porpax sentipes*	*Trithemis tropicana*
Chlorocypha curta	*Mesocnemis singularis*	*Pseudagrion glaucescens*	*Trithetrum congoense*
Chlorocypha glauca	*Micromacromia camerunica*	*Pseudagrion glaucoideum*	*Trithetrum navasi*
Chlorocypha rubida	*Neodythemis klingi*	*Pseudagrion glaucum*	*Umma cincta*
Chlorocypha trifaria	*Neodythemis preussi*	*Pseudagrion hageni*	*Umma longistigma*
Chlorocypha victoriae	*Neophya rutherfordi*	*Pseudagrion hamoni*	*Umma saphirina*
Copera nyansana	*Nesciothemis farinosa*	*Pseudagrion isidromorai*	*Urothemis assignata*
Crocothemis erythraea	*Neurogomphus alius*	*Pseudagrion kersteni*	*Urothemis edwardsii*
Crocothemis sanguinolenta	*Neurogomphus martininus*	*Pseudagrion kibalense*	*Zygonyx flavicosta*
Cyanothemis simpsoni	*Notiothemis robertsi*	*Pseudagrion melanicterum*	*Zygonyx natalensis*
Diastatomma multilineatum	*Olpogastra lugubris*	*Pseudagrion nubicum*	*Zygonyx regisalberti*
Diastatomma selysi	*Orthetrum africanum*	*Pseudagrion rufocinctum*	*Zygonyx torridus*
Diplacodes lefebvrii	*Orthetrum austeni*	*Pseudagrion serrulatum*	*Zyxomma atlanticum*
Diplacodes luminans	*Orthetrum guineense*	*Pseudagrion simplicilaminatum*	
Elattoneura acuta	*Orthetrum hintzi*	*Pseudagrion sjoestedti*	
Elattoneura centrafricana	*Orthetrum julia*	*Pseudagrion spernatum*	

AT0125: Northern Zanzibar-Inhambane Coastal Forest Mosaic (107 species, 1 189 records)

Species	Species	Species	Species
Aciagrion dondoense	*Gomphidia quarrei*	*Orthetrum icteromelas*	*Pseudagrion sjoestedti*
Aciagrion gracile	*Gynacantha immaculifrons*	*Orthetrum julia*	*Pseudagrion sublacteum*
Aethriamanta rezia	*Gynacantha manderica*	*Orthetrum stemmale*	*Rhyothemis semihyalina*
Agriocnemis exilis	*Gynacantha usambarica*	*Orthetrum trinacria*	*Sympetrum fonscolombii*
Agriocnemis gratiosa	*Gynacantha villosa*	*Palpopleura deceptor*	*Teinobasis alluaudi*
Allocnemis abbotti	*Hadrothemis scabrifrons*	*Palpopleura lucia*	*Tetrathemis polleni*
Anax ephippiger	*Hemistigma albipunctum*	*Palpopleura portia*	*Thermochoria jeanneli*
Anax imperator	*Ictinogomphus ferox*	*Pantala flavescens*	*Tholymis tillarga*
Anax speratus	*Ischnura senegalensis*	*Paragomphus cognatus*	*Tramea basilaris*
Anax tristis	*Lestes dissimulans*	*Paragomphus genei*	*Tramea limbata*
Atoconeura biordinata	*Lestes pallidus*	*Paragomphus magnus*	*Trithemis aconita*
Azuragrion nigridorsum	*Lestes tridens*	*Paragomphus sabicus*	*Trithemis annulata*
Brachythemis impartita	*Lestes uncifer*	*Phaon iridipennis*	*Trithemis arteriosa*
Brachythemis lacustris	*Lestinogomphus angustus*	*Phyllogomphus selysi*	*Trithemis bifida*
Brachythemis leucosticta	*Macrodiplax cora*	*Phyllomacromia contumax*	*Trithemis donaldsoni*
Bradinopyga cornuta	*Mesocnemis singularis*	*Phyllomacromia monoceros*	*Trithemis furva*
Ceriagrion glabrum	*Microgomphus nyassicus*	*Platycypha auripes*	*Trithemis hecate*
Ceriagrion kordofanicum	*Nepogomphoides stuhlmanni*	*Platycypha caligata*	*Trithemis kirbyi*
Ceriagrion suave	*Nesciothemis farinosa*	*Pseudagrion acaciae*	*Trithemis pluvialis*
Chalcostephia flavifrons	*Neurogomphus zambeziensis*	*Pseudagrion coeleste*	*Trithemis stictica*
Coryphagrion grandis	*Notogomphus dendrohyrax*	*Pseudagrion commoniae*	*Trithemis werneri*
Crocothemis divisa	*Olpogastra lugubris*	*Pseudagrion hageni*	*Urothemis assignata*
Crocothemis erythraea	*Orthetrum abbotti*	*Pseudagrion hamoni*	*Urothemis edwardsii*
Crocothemis sanguinolenta	*Orthetrum brachiale*	*Pseudagrion kersteni*	*Zygonoides fuelleborni*
Diplacodes lefebvrii	*Orthetrum chrysostigma*	*Pseudagrion lindicum*	*Zygonyx natalensis*
Diplacodes luminans	*Orthetrum guineense*	*Pseudagrion massaicum*	*Zygonyx torridus*
Elattoneura glauca	*Orthetrum hintzi*	*Pseudagrion niloticum*	

AT0126: Northwestern Congolian Lowland Forests (198 species, 2 474 records)

Species	Species	Species	Species
Aciagrion africanum	*Agriocnemis victoria*	*Atoconeura luxata*	*Ceriagrion varians*
Aciagrion balachowskyi	*Agriocnemis zerafica*	*Brachythemis impartita*	*Ceriagrion whellani*
Aciagrion brosseti	*Allocnemis contraria*	*Brachythemis leucosticta*	*Chalcostephia flavifrons*
Acisoma trifidum	*Allocnemis cyanura*	*Bradinopyga strachani*	*Chlorocypha aphrodite*
Aethiothemis solitaria	*Allocnemis nigripes*	*Ceriagrion annulatum*	*Chlorocypha cancellata*
Aethriamanta rezia	*Allocnemis pauli*	*Ceriagrion bakeri*	*Chlorocypha curta*
Africallagma vaginale	*Anax congoliath*	*Ceriagrion corallinum*	*Chlorocypha cyanifrons*
Agriocnemis exilis	*Anax ephippiger*	*Ceriagrion glabrum*	*Chlorocypha glauca*
Agriocnemis forcipata	*Anax imperator*	*Ceriagrion platystigma*	*Chlorocypha helenae*
Agriocnemis maclachlani	*Anax tristis*	*Ceriagrion tricrenaticeps*	*Chlorocypha pyriformosa*

AT0126: Northwestern Congolian Lowland Forests (*continued*)

Species	Species	Species	Species
Chlorocypha victoriae	*Ictinogomphus ferox*	*Palpopleura deceptor*	*Sapho gloriosa*
Copera nyansana	*Ictinogomphus fraseri*	*Palpopleura lucia*	*Stenocnemis pachystigma*
Copera rufipes	*Ictinogomphus regisalberti*	*Palpopleura portia*	*Stenocypha gracilis*
Copera sikassoensis	*Idomacromia proavita*	*Pantala flavescens*	*Tetrathemis camerunensis*
Cornigomphus guineensis	*Lestes dissimulans*	*Paragomphus genei*	*Tetrathemis fraseri*
Crocothemis erythraea	*Libyogomphus emiliae*	*Paragomphus zambeziensis*	*Tetrathemis longfieldae*
Crocothemis sanguinolenta	*Libyogomphus tenaculatus*	*Parazyxomma flavicans*	*Thermochoria equivocata*
Cyanothemis simpsoni	*Malgassophlebia bispina*	*Phaon camerunensis*	*Tholymis tillarga*
Diastatomma selysi	*Malgassophlebia westfalli*	*Phaon iridipennis*	*Tragogomphus ellioti*
Diastatomma tricolor	*Micromacromia camerunica*	*Phyllogomphus coloratus*	*Tramea basilaris*
Diplacodes lefebvrii	*Micromacromia zygoptera*	*Phyllogomphus selysi*	*Trithemis aconita*
Diplacodes luminans	*Neodythemis afra*	*Phyllomacromia bicristulata*	*Trithemis aenea*
Elattoneura acuta	*Neodythemis klingi*	*Phyllomacromia contumax*	*Trithemis apicalis*
Elattoneura incerta	*Neodythemis preussi*	*Phyllomacromia funicularioides*	*Trithemis arteriosa*
Elattoneura josemorai	*Neophya rutherfordi*	*Phyllomacromia insignis*	*Trithemis bifida*
Elattoneura lliba	*Nesciothemis pujoli*	*Phyllomacromia melania*	*Trithemis congolica*
Elattoneura morini	*Neurogomphus alius*	*Phyllomacromia paula*	*Trithemis dichroa*
Elattoneura nigra	*Neurogomphus martininus*	*Phyllomacromia sophia*	*Trithemis fumosa*
Elattoneura pruinosa	*Neurogomphus uelensis*	*Platycypha picta*	*Trithemis grouti*
Elattoneura tsiamae	*Neurolestes trinervis*	*Platycypha rufitibia*	*Trithemis hartwigi*
Elattoneura vittata	*Notiothemis robertsi*	*Porpax asperipes*	*Trithemis imitata*
Elattoneura vrijdaghi	*Notogomphus spinosus*	*Porpax bipunctus*	*Trithemis nuptialis*
Eleuthemis buettikoferi	*Nubiolestes diotima*	*Pseudagrion epiphonematicum*	*Trithemis palustris*
Gomphidia gamblesi	*Olpogastra lugubris*	*Pseudagrion glaucescens*	*Trithemis pruinata*
Gomphidia quarrei	*Orthetrum abbotti*	*Pseudagrion glaucoideum*	*Trithemis tropicana*
Gynacantha africana	*Orthetrum africanum*	*Pseudagrion glaucum*	*Trithetrum navasi*
Gynacantha bullata	*Orthetrum austeni*	*Pseudagrion grilloti*	*Umma cincta*
Gynacantha cylindrata	*Orthetrum brachiale*	*Pseudagrion hamoni*	*Umma longistigma*
Gynacantha nigeriensis	*Orthetrum chrysostigma*	*Pseudagrion hemicolon*	*Umma mesostigma*
Gynacantha sextans	*Orthetrum guineense*	*Pseudagrion isidromorai*	*Urothemis assignata*
Gynacantha vesiculata	*Orthetrum hintzi*	*Pseudagrion kersteni*	*Urothemis edwardsii*
Gynacantha victoriae	*Orthetrum icteromelas*	*Pseudagrion kibalense*	*Zygonyx flavicosta*
Hadrothemis camarensis	*Orthetrum julia*	*Pseudagrion melanicterum*	*Zygonyx natalensis*
Hadrothemis coacta	*Orthetrum latihami*	*Pseudagrion serrulatum*	*Zygonyx regisalberti*
Hadrothemis defecta	*Orthetrum microstigma*	*Pseudagrion simonae*	*Zygonyx speciosus*
Hadrothemis infesta	*Orthetrum monardi*	*Pseudagrion sjoestedti*	*Zygonyx torridus*
Hadrothemis versuta	*Orthetrum saegeri*	*Rhyothemis fenestrina*	*Zyxomma atlanticum*
Heliaeschna fuliginosa	*Orthetrum stemmale*	*Rhyothemis notata*	
Heliaeschna sembe	*Oxythemis phoenicosceles*	*Rhyothemis semihyalina*	
Hemistigma albipunctum	*Palpopleura albifrons*	*Sapho bicolor*	

AT0128: Southern Zanzibar-Inhambane Coastal Forest Mosaic (46 species, 120 records)

Species	Species	Species	Species
Africallagma sinuatum	*Chlorolestes elegans*	*Orthetrum hintzi*	*Proischnura subfurcata*
Agriocnemis exilis	*Crocothemis sanguinolenta*	*Orthetrum icteromelas*	*Pseudagrion commoniae*
Agriocnemis gratiosa	*Diplacodes lefebvrii*	*Orthetrum julia*	*Pseudagrion lindicum*
Allocnemis marshalli	*Elattoneura glauca*	*Orthetrum machadoi*	*Pseudagrion spernatum*
Anax ephippiger	*Gynacantha usambarica*	*Orthetrum macrostigma*	*Tramea limbata*
Anax speratus	*Hemistigma albipunctum*	*Palpopleura jucunda*	*Trithemis furva*
Atoconeura biordinata	*Ischnura senegalensis*	*Palpopleura lucia*	*Umma declivium*
Azuragrion nigridorsum	*Lestes virgatus*	*Paragomphus cognatus*	*Urothemis assignata*
Bradinopyga cornuta	*Nepogomphoides stuhlmanni*	*Phaon iridipennis*	*Zosteraeschna usambarica*
Ceriagrion glabrum	*Orthetrum brachiale*	*Phyllomacromia monoceros*	*Zygonyx natalensis*
Ceriagrion suave	*Orthetrum caffrum*	*Pinheyschna rileyi*	
Chlorocypha consueta	*Orthetrum guineense*	*Platycypha caligata*	

AT0129: Western Congolian Swamp Forests (142 species, 949 records)

Species	Species	Species	Species
Aciagrion africanum	*Chlorocypha victoriae*	*Hadrothemis coacta*	*Orthetrum guineense*
Acisoma trifidum	*Copera nyansana*	*Hadrothemis defecta*	*Orthetrum hintzi*
Aethiothemis basilewskyi	*Crenigomphus renei*	*Hadrothemis infesta*	*Orthetrum julia*
Aethiothemis erythromelas	*Crocothemis divisa*	*Hadrothemis versuta*	*Orthetrum microstigma*
Aethriamanta rezia	*Crocothemis erythraea*	*Hadrothemis vrijdaghi*	*Orthetrum saegeri*
Agriocnemis forcipata	*Cyanothemis simpsoni*	*Heliaeschna cynthiae*	*Orthetrum stemmale*
Agriocnemis maclachlani	*Diastatomma multilineatum*	*Heliaeschna fuliginosa*	*Oxythemis phoenicosceles*
Agriocnemis stygia	*Diastatomma selysi*	*Heliaeschna sembe*	*Palpopleura deceptor*
Allocnemis nigripes	*Diastatomma tricolor*	*Hemistigma albipunctum*	*Palpopleura lucia*
Anax chloromelas	*Diplacodes deminuta*	*Ictinogomphus ferox*	*Palpopleura portia*
Anax ephippiger	*Diplacodes lefebvrii*	*Ictinogomphus regisalberti*	*Pantala flavescens*
Anax imperator	*Diplacodes luminans*	*Lestes dissimulans*	*Paragomphus acuminatus*
Anax tristis	*Elattoneura centrafricana*	*Lestes uncifer*	*Parazyxomma flavicans*
Brachythemis lacustris	*Elattoneura incerta*	*Mesocnemis saralisa*	*Phaon camerunensis*
Brachythemis leucosticta	*Elattoneura lliba*	*Mesocnemis singularis*	*Phaon iridipennis*
Bradinopyga strachani	*Elattoneura vittata*	*Micromacromia camerunica*	*Phyllogomphus annulus*
Ceriagrion corallinum	*Elattoneura vrijdaghi*	*Neodythemis klingi*	*Phyllogomphus coloratus*
Ceriagrion glabrum	*Gomphidia bredoi*	*Neodythemis preussi*	*Phyllogomphus selysi*
Ceriagrion ignitum	*Gomphidia quarrei*	*Nesciothemis farinosa*	*Phyllomacromia contumax*
Ceriagrion varians	*Gynacantha africana*	*Notiothemis robertsi*	*Phyllomacromia insignis*
Chalcostephia flavifrons	*Gynacantha bullata*	*Olpogastra lugubris*	*Phyllomacromia maesi*
Chlorocypha aphrodite	*Gynacantha cylindrata*	*Orthetrum africanum*	*Phyllomacromia paula*
Chlorocypha cyanifrons	*Gynacantha manderica*	*Orthetrum austeni*	*Porpax asperipes*
Chlorocypha pyriformosa	*Gynacantha nigeriensis*	*Orthetrum brachiale*	*Porpax garambensis*
Chlorocypha trifaria	*Gynacantha sextans*	*Orthetrum chrysostigma*	*Porpax sentipes*

AT0129: Western Congolian Swamp Forests (*continued*)

Species	Species	Species	Species
Pseudagrion glaucescens	*Sapho bicolor*	*Trithemis bredoi*	*Umma longistigma*
Pseudagrion glaucum	*Sapho gloriosa*	*Trithemis congolica*	*Umma saphirina*
Pseudagrion kibalense	*Sapho orichalcea*	*Trithemis dichroa*	*Urothemis assignata*
Pseudagrion malagasoides	*Tetrathemis camerunensis*	*Trithemis grouti*	*Urothemis edwardsii*
Pseudagrion melanicterum	*Tetrathemis longfieldae*	*Trithemis imitata*	*Zygonoides occidentis*
Pseudagrion nubicum	*Thermochoria equivocata*	*Trithemis longistyla*	*Zygonyx eusebia*
Pseudagrion simplicilaminatum	*Tholymis tillarga*	*Trithemis nuptialis*	*Zygonyx flavicosta*
Pseudagrion sjoestedti	*Tramea basilaris*	*Trithemis pruinata*	*Zygonyx regisalberti*
Pseudagrion thenartum	*Trithemis aenea*	*Trithemis tropicana*	*Zyxomma atlanticum*
Rhyothemis fenestrina	*Trithemis annulata*	*Trithetrum congoense*	
Rhyothemis notata	*Trithemis apicalis*	*Trithetrum navasi*	

AT0130: Western Guinean Lowland Forests (183 species, 4 087 records)

Species	Species	Species	Species
Aciagrion africanum	*Ceriagrion corallinum*	*Elattoneura balli*	*Libyogomphus christinae*
Aciagrion gracile	*Ceriagrion glabrum*	*Elattoneura girardi*	*Malgassophlebia bispina*
Acisoma inflatum	*Ceriagrion rubellocerinum*	*Elattoneura nigra*	*Mesocnemis singularis*
Acisoma trifidum	*Ceriagrion suave*	*Elattoneura villiersi*	*Mesocnemis tisi*
Aethiothemis bella	*Ceriagrion tricrenaticeps*	*Eleuthemis buettikoferi*	*Micromacromia camerunica*
Aethiothemis incongruens	*Ceriagrion whellani*	*Gomphidia gamblesi*	*Micromacromia zygoptera*
Aethiothemis mediofasciata	*Chalcostephia flavifrons*	*Gynacantha africana*	*Neodythemis campioni*
Aethiothemis solitaria	*Chlorocypha curta*	*Gynacantha bullata*	*Neodythemis klingi*
Aethriamanta rezia	*Chlorocypha cyanifrons*	*Gynacantha cylindrata*	*Neophya rutherfordi*
Africallagma subtile	*Chlorocypha dispar*	*Gynacantha nigeriensis*	*Nesciothemis minor*
Agriocnemis angustirami	*Chlorocypha luminosa*	*Gynacantha sextans*	*Nesciothemis nigeriensis*
Agriocnemis exilis	*Chlorocypha pyriformosa*	*Gynacantha vesiculata*	*Nesciothemis pujoli*
Agriocnemis maclachlani	*Chlorocypha radix*	*Gynacantha victoriae*	*Notiothemis robertsi*
Agriocnemis victoria	*Chlorocypha rubida*	*Hadrothemis camarensis*	*Olpogastra lugubris*
Agriocnemis zerafica	*Chlorocypha selysi*	*Hadrothemis coacta*	*Orthetrum abbotti*
Allocnemis elongata	*Copera guttifera*	*Hadrothemis defecta*	*Orthetrum africanum*
Allocnemis flavipennis	*Copera sikassoensis*	*Hadrothemis infesta*	*Orthetrum angustiventre*
Allocnemis subnodalis	*Cornigomphus mariannae*	*Hadrothemis versuta*	*Orthetrum austeni*
Anax imperator	*Crocothemis divisa*	*Heliaeschna fuliginosa*	*Orthetrum brachiale*
Anax rutherfordi	*Crocothemis erythraea*	*Hemistigma albipunctum*	*Orthetrum chrysostigma*
Anax tristis	*Crocothemis sanguinolenta*	*Ictinogomphus ferox*	*Orthetrum guineense*
Atoconeura luxata	*Cyanothemis simpsoni*	*Ictinogomphus fraseri*	*Orthetrum hintzi*
Brachythemis impartita	*Diastatomma gamblesi*	*Idomacromia proavita*	*Orthetrum icteromelas*
Brachythemis lacustris	*Diplacodes deminuta*	*Ischnura senegalensis*	*Orthetrum julia*
Bradinopyga strachani	*Diplacodes lefebvrii*	*Lestes dissimulans*	*Orthetrum latihami*
Ceriagrion bakeri	*Diplacodes luminans*	*Lestinogomphus matilei*	*Orthetrum microstigma*

AT0130: Western Guinean Lowland Forests (*continued*)

Species	Species	Species	Species
Orthetrum monardi	*Phyllomacromia contumax*	*Pseudagrion sjoestedti*	*Trithemis basitincta*
Orthetrum saegeri	*Phyllomacromia hervei*	*Pseudagrion sublacteum*	*Trithemis bredoi*
Orthetrum stemmale	*Phyllomacromia lamottei*	*Rhyothemis fenestrina*	*Trithemis dejouxi*
Orthetrum trinacria	*Phyllomacromia melania*	*Rhyothemis notata*	*Trithemis dichroa*
Oxythemis phoenicosceles	*Phyllomacromia occidentalis*	*Rhyothemis semihyalina*	*Trithemis grouti*
Palpopleura deceptor	*Phyllomacromia sophia*	*Sapho bicolor*	*Trithemis hecate*
Palpopleura jucunda	*Porpax bipunctus*	*Sapho ciliata*	*Trithemis imitata*
Palpopleura lucia	*Pseudagrion camerunense*	*Sapho fumosa*	*Trithemis kalula*
Palpopleura portia	*Pseudagrion cyathiforme*	*Tetrathemis camerunensis*	*Trithemis kirbyi*
Pantala flavescens	*Pseudagrion epiphonematicum*	*Tetrathemis godiardi*	*Trithemis stictica*
Paragomphus genei	*Pseudagrion gigas*	*Tetrathemis polleni*	*Trithetrum navasi*
Paragomphus kiautai	*Pseudagrion glaucescens*	*Thermochoria equivocata*	*Umma cincta*
Paragomphus nigroviridis	*Pseudagrion glaucoideum*	*Tholymis tillarga*	*Urothemis assignata*
Paragomphus serrulatus	*Pseudagrion glaucum*	*Tramea basilaris*	*Urothemis edwardsii*
Paragomphus tournieri	*Pseudagrion hamoni*	*Tramea limbata*	*Zygonyx chrysobaphes*
Parazyxomma flavicans	*Pseudagrion hemicolon*	*Trithemis aconita*	*Zygonyx flavicosta*
Phaon camerunensis	*Pseudagrion isidromorai*	*Trithemis aenea*	*Zygonyx geminuncus*
Phaon iridipennis	*Pseudagrion malagasoides*	*Trithemis africana*	*Zygonyx torridus*
Phyllogomphus moundi	*Pseudagrion melanicterum*	*Trithemis annulata*	*Zyxomma atlanticum*
Phyllomacromia aeneothorax	*Pseudagrion nubicum*	*Trithemis arteriosa*	

AT0203: Zambezian Cryptosepalum Dry Forests (2 species, 2 records)

Species
Diplacodes deminuta
Orthetrum julia

AT0701: Angolan Miombo Woodlands (112 species, 1 156 records)

Species	Species	Species	Species
Acisoma inflatum	*Agriocnemis exilis*	*Ceriagrion corallinum*	*Diplacodes deminuta*
Aethiothemis bequaerti	*Agriocnemis victoria*	*Ceriagrion glabrum*	*Diplacodes lefebvrii*
Aethiothemis mediofasciata	*Allocnemis nigripes*	*Ceriagrion suave*	*Diplacodes luminans*
Aethiothemis solitaria	*Anax ephippiger*	*Ceriagrion whellani*	*Diplacodes pumila*
Aethriamanta rezia	*Anax imperator*	*Chlorocypha crocea*	*Elattoneura glauca*
Africallagma fractum	*Anax speratus*	*Chlorocypha fabamacula*	*Hemistigma albipunctum*
Africallagma glaucum	*Anax tristis*	*Crocothemis brevistigma*	*Ictinogomphus dundoensis*
Africallagma subtile	*Azuragrion nigridorsum*	*Crocothemis divisa*	*Ictinogomphus ferox*
Agriocnemis angolensis	*Brachythemis lacustris*	*Crocothemis erythraea*	*Ischnura senegalensis*
Agriocnemis bumhilli	*Brachythemis leucosticta*	*Crocothemis sanguinolenta*	*Lestes amicus*

AT0701: Angolan Miombo Woodlands (*continued*)

Species	Species	Species	Species
Lestes dissimulans	*Orthetrum monardi*	*Pseudagrion deningi*	*Trithemis annulata*
Lestes pallidus	*Orthetrum trinacria*	*Pseudagrion estesi*	*Trithemis anomala*
Lestes pinheyi	*Palpopleura jucunda*	*Pseudagrion glaucescens*	*Trithemis arteriosa*
Lestes plagiatus	*Palpopleura lucia*	*Pseudagrion greeni*	*Trithemis dorsalis*
Nesciothemis farinosa	*Palpopleura portia*	*Pseudagrion hamoni*	*Trithemis furva*
Nesciothemis fitzgeraldi	*Pantala flavescens*	*Pseudagrion inconspicuum*	*Trithemis grouti*
Notogomphus praetorius	*Paragomphus genei*	*Pseudagrion kersteni*	*Trithemis kirbyi*
Olpogastra lugubris	*Phaon iridipennis*	*Pseudagrion massaicum*	*Trithemis leakeyi*
Orthetrum abbotti	*Phyllogomphus annulus*	*Pseudagrion rufostigma*	*Trithemis monardi*
Orthetrum brachiale	*Phyllogomphus selysi*	*Pseudagrion salisburyense*	*Trithemis palustris*
Orthetrum caffrum	*Phyllomacromia picta*	*Pseudagrion sjoestedti*	*Trithemis pluvialis*
Orthetrum chrysostigma	*Pinheyagrion angolicum*	*Pseudagrion sublacteum*	*Trithemis stictica*
Orthetrum guineense	*Platycypha angolensis*	*Rhyothemis fenestrina*	*Umma electa*
Orthetrum hintzi	*Platycypha caligata*	*Rhyothemis mariposa*	*Urothemis assignata*
Orthetrum icteromelas	*Platycypha rufitibia*	*Sympetrum fonscolombii*	*Urothemis edwardsii*
Orthetrum julia	*Pseudagrion acaciae*	*Tholymis tillarga*	*Zygonyx flavicosta*
Orthetrum macrostigma	*Pseudagrion angolense*	*Tramea basilaris*	*Zygonyx natalensis*
Orthetrum microstigma	*Pseudagrion coeleste*	*Trithemis aconita*	*Zygonyx torridus*

AT0702: Angolan Mopane Woodlands (48 species, 301 records)

Species	Species	Species	Species
Africallagma glaucum	*Diplacodes lefebvrii*	*Orthetrum chrysostigma*	*Tholymis tillarga*
Anax ephippiger	*Diplacodes luminans*	*Orthetrum julia*	*Tramea basilaris*
Anax imperator	*Elattoneura glauca*	*Orthetrum trinacria*	*Trithemis annulata*
Anax speratus	*Hemistigma albipunctum*	*Palpopleura jucunda*	*Trithemis arteriosa*
Anax tristis	*Ictinogomphus ferox*	*Palpopleura portia*	*Trithemis donaldsoni*
Brachythemis lacustris	*Ischnura senegalensis*	*Pantala flavescens*	*Trithemis hecate*
Brachythemis leucosticta	*Lestes pallidus*	*Paragomphus elpidius*	*Trithemis kirbyi*
Bradinopyga cornuta	*Lestinogomphus angustus*	*Paragomphus genei*	*Trithetrum navasi*
Crenigomphus kavangoensis	*Mesocnemis singularis*	*Phyllomacromia contumax*	*Urothemis edwardsii*
Crocothemis divisa	*Nesciothemis farinosa*	*Pseudagrion sublacteum*	*Zosteraeschna minuscula*
Crocothemis erythraea	*Olpogastra lugubris*	*Rhyothemis semihyalina*	*Zygonoides fuelleborni*
Crocothemis sanguinolenta	*Orthetrum brachiale*	*Sympetrum fonscolombii*	*Zygonyx natalensis*

AT0704: Central Zambezian Miombo Woodlands (265 species, 7 696 records)

Species	Species	Species	Species
Aciagrion africanum	*Aciagrion nodosum*	*Aethiothemis basilewskyi*	*Aethiothemis solitaria*
Aciagrion gracile	*Aciagrion steeleae*	*Aethiothemis bequaerti*	*Aethriamanta rezia*
Aciagrion heterostictum	*Acisoma trifidum*	*Aethiothemis ellioti*	*Africallagma fractum*

AT0704: Central Zambezian Miombo Woodlands (*continued*)

Species	Species	Species	Species
Africallagma glaucum	*Chalcostephia flavifrons*	*Hemistigma albipunctum*	*Orthetrum chrysostigma*
Africallagma pallidulum	*Chlorocypha consueta*	*Ictinogomphus dundoensis*	*Orthetrum guineense*
Africallagma pseudelongatum	*Chlorocypha fabamacula*	*Ictinogomphus ferox*	*Orthetrum hintzi*
Africallagma sinuatum	*Chlorocypha frigida*	*Ictinogomphus regisalberti*	*Orthetrum icteromelas*
Africallagma subtile	*Chlorocypha trifaria*	*Ischnura senegalensis*	*Orthetrum julia*
Africallagma vaginale	*Chlorocypha wittei*	*Lestes amicus*	*Orthetrum machadoi*
Afroaeschna scotias	*Crenigomphus cornutus*	*Lestes dissimulans*	*Orthetrum macrostigma*
Agriocnemis angolensis	*Crenigomphus hartmanni*	*Lestes ictericus*	*Orthetrum microstigma*
Agriocnemis exilis	*Crocothemis brevistigma*	*Lestes ochraceus*	*Orthetrum monardi*
Agriocnemis gratiosa	*Crocothemis divisa*	*Lestes pallidus*	*Orthetrum robustum*
Agriocnemis pinheyi	*Crocothemis erythraea*	*Lestes pinheyi*	*Orthetrum saegeri*
Agriocnemis victoria	*Crocothemis sanguinolenta*	*Lestes plagiatus*	*Orthetrum stemmale*
Allocnemis marshalli	*Crocothemis saxicolor*	*Lestes tridens*	*Orthetrum trinacria*
Allocnemis mitwabae	*Diastatomma selysi*	*Lestes uncifer*	*Palpopleura albifrons*
Allocnemis nigripes	*Diastatomma soror*	*Lestes virgatus*	*Palpopleura deceptor*
Allocnemis superba	*Diplacodes deminuta*	*Lestinogomphus angustus*	*Palpopleura jucunda*
Allocnemis wittei	*Diplacodes lefebvrii*	*Malgassophlebia bispina*	*Palpopleura lucia*
Anaciaeschna triangulifera	*Diplacodes luminans*	*Mesocnemis saralisa*	*Palpopleura portia*
Anax bangweuluensis	*Diplacodes pumila*	*Mesocnemis singularis*	*Pantala flavescens*
Anax chloromelas	*Elattoneura cellularis*	*Microgomphus nyassicus*	*Paragomphus cognatus*
Anax congoliath	*Elattoneura glauca*	*Micromacromia camerunica*	*Paragomphus elpidius*
Anax ephippiger	*Eleuthemis quadrigutta*	*Neodythemis fitzgeraldi*	*Paragomphus genei*
Anax imperator	*Gomphidia quarrei*	*Neodythemis klingi*	*Paragomphus machadoi*
Anax speratus	*Gynacantha bullata*	*Neodythemis preussi*	*Paragomphus nyasicus*
Anax tristis	*Gynacantha cylindrata*	*Nesciothemis farinosa*	*Paragomphus sabicus*
Atoconeura biordinata	*Gynacantha immaculifrons*	*Nesciothemis fitzgeraldi*	*Parazyxomma flavicans*
Atoconeura eudoxia	*Gynacantha manderica*	*Neurogomphus cocytius*	*Phaon iridipennis*
Atoconeura pseudeudoxia	*Gynacantha nigeriensis*	*Notiothemis jonesi*	*Phyllogomphus annulus*
Azuragrion nigridorsum	*Gynacantha sextans*	*Notiothemis robertsi*	*Phyllogomphus selysi*
Brachythemis lacustris	*Gynacantha usambarica*	*Notogomphus dendrohyrax*	*Phyllomacromia aureozona*
Brachythemis leucosticta	*Gynacantha vesiculata*	*Notogomphus leroyi*	*Phyllomacromia contumax*
Bradinopyga cornuta	*Gynacantha villosa*	*Notogomphus praetorius*	*Phyllomacromia maesi*
Bradinopyga strachani	*Hadrothemis camarensis*	*Olpogastra lugubris*	*Phyllomacromia melania*
Ceriagrion bakeri	*Hadrothemis coacta*	*Onychogomphus kitchingmani*	*Phyllomacromia monoceros*
Ceriagrion corallinum	*Hadrothemis defecta*	*Onychogomphus seydeli*	*Phyllomacromia picta*
Ceriagrion glabrum	*Hadrothemis scabrifrons*	*Onychogomphus styx*	*Phyllomacromia sylvatica*
Ceriagrion katamborae	*Hadrothemis versuta*	*Orthetrum abbotti*	*Phyllomacromia unifasciata*
Ceriagrion platystigma	*Heliaeschna cynthiae*	*Orthetrum angustiventre*	*Pinheyagrion angolicum*
Ceriagrion sakejii	*Heliaeschna fuliginosa*	*Orthetrum austeni*	*Pinheyschna meruensis*
Ceriagrion suave	*Heliaeschna sembe*	*Orthetrum brachiale*	*Pinheyschna rileyi*
Ceriagrion varians	*Heliaeschna ugandica*	*Orthetrum caffrum*	*Platycypha caligata*
Ceriagrion whellani	*Hemicordulia africana*	*Orthetrum camerunense*	*Platycypha lacustris*

AT0704: Central Zambezian Miombo Woodlands (*continued*)

Species	Species	Species	Species
Platycypha pinheyi	*Pseudagrion kibalense*	*Trithemis aconita*	*Trithemis pruinata*
Porpax asperipes	*Pseudagrion lindicum*	*Trithemis aenea*	*Trithemis stictica*
Porpax garambensis	*Pseudagrion makabusiense*	*Trithemis aequalis*	*Trithemis tropicana*
Porpax risi	*Pseudagrion massaicum*	*Trithemis annulata*	*Trithemis werneri*
Porpax sentipes	*Pseudagrion melanicterum*	*Trithemis anomala*	*Trithetrum navasi*
Proischnura subfurcata	*Pseudagrion nubicum*	*Trithemis apicalis*	*Umma declivium*
Pseudagrion acaciae	*Pseudagrion rufostigma*	*Trithemis arteriosa*	*Umma electa*
Pseudagrion assegaii	*Pseudagrion salisburyense*	*Trithemis bifida*	*Umma saphirina*
Pseudagrion coeleste	*Pseudagrion sjoestedti*	*Trithemis congolica*	*Urothemis assignata*
Pseudagrion coeruleipunctum	*Pseudagrion spernatum*	*Trithemis dichroa*	*Urothemis edwardsii*
Pseudagrion commoniae	*Pseudagrion sublacteum*	*Trithemis donaldsoni*	*Zosteraeschna usambarica*
Pseudagrion deningi	*Pseudagrion sudanicum*	*Trithemis dorsalis*	*Zygonoides fuelleborni*
Pseudagrion fisheri	*Pseudagrion symoensii*	*Trithemis furva*	*Zygonyx atritibiae*
Pseudagrion gamblesi	*Rhyothemis fenestrina*	*Trithemis grouti*	*Zygonyx eusebia*
Pseudagrion glaucescens	*Rhyothemis mariposa*	*Trithemis hecate*	*Zygonyx flavicosta*
Pseudagrion glaucoideum	*Rhyothemis semihyalina*	*Trithemis integra*	*Zygonyx natalensis*
Pseudagrion greeni	*Sympetrum fonscolombii*	*Trithemis kirbyi*	*Zygonyx regisalberti*
Pseudagrion hageni	*Tetrathemis polleni*	*Trithemis leakeyi*	*Zygonyx torridus*
Pseudagrion hamoni	*Thermochoria equivocata*	*Trithemis monardi*	*Zyxomma atlanticum*
Pseudagrion helenae	*Thermochoria jeanneli*	*Trithemis nuptialis*	
Pseudagrion inconspicuum	*Tholymis tillarga*	*Trithemis palustris*	
Pseudagrion kersteni	*Tramea basilaris*	*Trithemis pluvialis*	

AT0705: East Sudanian Savanna (135 species, 458 records)

Species	Species	Species	Species
Aciagrion africanum	*Anax imperator*	*Chalcostephia flavifrons*	*Gynacantha manderica*
Aciagrion gracile	*Anax speratus*	*Chlorocypha curta*	*Gynacantha sextans*
Acisoma inflatum	*Anax tristis*	*Chlorocypha trifaria*	*Gynacantha vesiculata*
Acisoma variegatum	*Azuragrion vansomereni*	*Crenigomphus hartmanni*	*Gynacantha villosa*
Aethiothemis solitaria	*Brachythemis impartita*	*Crenigomphus renei*	*Hadrothemis defecta*
Aethriamanta rezia	*Brachythemis lacustris*	*Crocothemis divisa*	*Hemicordulia africana*
Africallagma elongatum	*Brachythemis leucosticta*	*Crocothemis erythraea*	*Hemistigma albipunctum*
Africallagma subtile	*Brachythemis wilsoni*	*Crocothemis sanguinolenta*	*Ictinogomphus ferox*
Agriocnemis exilis	*Bradinopyga cornuta*	*Diplacodes deminuta*	*Ischnura senegalensis*
Agriocnemis forcipata	*Bradinopyga strachani*	*Diplacodes lefebvrii*	*Lestes dissimulans*
Agriocnemis inversa	*Ceriagrion bakeri*	*Diplacodes luminans*	*Lestes ictericus*
Agriocnemis victoria	*Ceriagrion corallinum*	*Elattoneura glauca*	*Lestes pallidus*
Agriocnemis zerafica	*Ceriagrion glabrum*	*Gomphidia bredoi*	*Lestes pinheyi*
Anaciaeschna triangulifera	*Ceriagrion kordofanicum*	*Gynacantha bullata*	*Lestes plagiatus*
Anax ephippiger	*Ceriagrion suave*	*Gynacantha cylindrata*	*Lestes uncifer*

AT0705: East Sudanian Savanna (*continued*)

Species	Species	Species	Species
Lestes virgatus	*Palpopleura jucunda*	*Pseudagrion hamoni*	*Trithemis annulata*
Mesocnemis singularis	*Palpopleura lucia*	*Pseudagrion kersteni*	*Trithemis arteriosa*
Nesciothemis farinosa	*Palpopleura portia*	*Pseudagrion massaicum*	*Trithemis dichroa*
Notogomphus dorsalis	*Pantala flavescens*	*Pseudagrion melanicterum*	*Trithemis furva*
Olpogastra lugubris	*Paragomphus cognatus*	*Pseudagrion nubicum*	*Trithemis hecate*
Orthetrum abbotti	*Paragomphus elpidius*	*Pseudagrion salisburyense*	*Trithemis imitata*
Orthetrum angustiventre	*Paragomphus genei*	*Pseudagrion sjoestedti*	*Trithemis integra*
Orthetrum brachiale	*Parazyxomma flavicans*	*Pseudagrion spernatum*	*Trithemis kirbyi*
Orthetrum caffrum	*Phaon iridipennis*	*Pseudagrion sublacteum*	*Trithemis pruinata*
Orthetrum chrysostigma	*Phyllomacromia contumax*	*Pseudagrion sudanicum*	*Trithemis stictica*
Orthetrum guineense	*Phyllomacromia hervei*	*Pseudagrion torridum*	*Trithemis werneri*
Orthetrum hintzi	*Phyllomacromia picta*	*Rhyothemis fenestrina*	*Trithetrum navasi*
Orthetrum icteromelas	*Pinheyschna waterstoni*	*Rhyothemis semihyalina*	*Umma saphirina*
Orthetrum julia	*Platycypha caligata*	*Tetrathemis polleni*	*Urothemis assignata*
Orthetrum machadoi	*Platycypha lacustris*	*Thermochoria equivocata*	*Urothemis edwardsii*
Orthetrum sabina	*Pseudagrion assegaii*	*Tholymis tillarga*	*Zygonoides fraseri*
Orthetrum stemmale	*Pseudagrion glaucescens*	*Tramea basilaris*	*Zygonyx natalensis*
Orthetrum trinacria	*Pseudagrion glaucum*	*Trithemis aconita*	*Zygonyx torridus*
Palpopleura deceptor	*Pseudagrion hageni*	*Trithemis aenea*	

AT0706: East Miombo Woodlands (97 species, 405 records)

Species	Species	Species	Species
Acisoma inflatum	*Chlorocypha consueta*	*Lestes virgatus*	*Palpopleura jucunda*
Africallagma fractum	*Coryphagrion grandis*	*Lestinogomphus angustus*	*Palpopleura lucia*
Africallagma glaucum	*Crenigomphus hartmanni*	*Mesocnemis singularis*	*Palpopleura portia*
Africallagma subtile	*Crocothemis divisa*	*Nepogomphoides stuhlmanni*	*Pantala flavescens*
Agriocnemis exilis	*Crocothemis erythraea*	*Nesciothemis farinosa*	*Paragomphus cognatus*
Agriocnemis gratiosa	*Crocothemis sanguinolenta*	*Notogomphus dendrohyrax*	*Paragomphus elpidius*
Allocnemis abbotti	*Crocothemis saxicolor*	*Notogomphus zernyi*	*Paragomphus genei*
Anaciaeschna triangulifera	*Diplacodes lefebvrii*	*Olpogastra lugubris*	*Paragomphus nyasicus*
Anax ephippiger	*Diplacodes luminans*	*Orthetrum abbotti*	*Paragomphus sabicus*
Anax imperator	*Elattoneura cellularis*	*Orthetrum brachiale*	*Phaon iridipennis*
Anax speratus	*Elattoneura glauca*	*Orthetrum caffrum*	*Phyllomacromia picta*
Anax tristis	*Gomphidia quarrei*	*Orthetrum chrysostigma*	*Platycypha auripes*
Atoconeura biordinata	*Gynacantha villosa*	*Orthetrum guineense*	*Platycypha caligata*
Brachythemis lacustris	*Hadrothemis scabrifrons*	*Orthetrum hintzi*	*Proischnura subfurcata*
Brachythemis leucosticta	*Hemistigma albipunctum*	*Orthetrum icteromelas*	*Pseudagrion coeleste*
Bradinopyga cornuta	*Ictinogomphus ferox*	*Orthetrum julia*	*Pseudagrion commoniae*
Ceriagrion glabrum	*Ischnura senegalensis*	*Orthetrum stemmale*	*Pseudagrion glaucescens*
Chalcostephia flavifrons	*Lestes plagiatus*	*Orthetrum trinacria*	*Pseudagrion hageni*

AT0706: East Miombo Woodlands (*continued*)

Species	Species	Species	Species
Pseudagrion hamoni	*Tetrathemis polleni*	*Trithemis donaldsoni*	*Urothemis assignata*
Pseudagrion kersteni	*Thermochoria jeanneli*	*Trithemis furva*	*Urothemis edwardsii*
Pseudagrion massaicum	*Tholymis tillarga*	*Trithemis kirbyi*	*Zygonyx natalensis*
Pseudagrion salisburyense	*Tramea basilaris*	*Trithemis pluvialis*	*Zygonyx torridus*
Pseudagrion spernatum	*Trithemis aconita*	*Trithemis stictica*	
Pseudagrion sublacteum	*Trithemis annulata*	*Trithemis werneri*	
Rhyothemis semihyalina	*Trithemis arteriosa*	*Umma declivium*	

AT0707: Guinean Forest-Savanna Mosaic (177 species, 2 649 records)

Species	Species	Species	Species
Aciagrion gracile	*Chalcostephia flavifrons*	*Gynacantha sextans*	*Orthetrum abbotti*
Acisoma inflatum	*Chlorocypha curta*	*Gynacantha vesiculata*	*Orthetrum africanum*
Acisoma trifidum	*Chlorocypha dispar*	*Hadrothemis camarensis*	*Orthetrum angustiventre*
Aethiothemis solitaria	*Chlorocypha luminosa*	*Hadrothemis defecta*	*Orthetrum austeni*
Aethriamanta rezia	*Chlorocypha pyriformosa*	*Hadrothemis infesta*	*Orthetrum brachiale*
Africallagma subtile	*Chlorocypha radix*	*Hemistigma albipunctum*	*Orthetrum camerunense*
Africocypha centripunctata	*Chlorocypha rubida*	*Ictinogomphus ferox*	*Orthetrum chrysostigma*
Agriocnemis exilis	*Chlorocypha selysi*	*Ictinogomphus fraseri*	*Orthetrum guineense*
Agriocnemis maclachlani	*Copera sikassoensis*	*Idomacromia proavita*	*Orthetrum hintzi*
Agriocnemis victoria	*Crenigomphus renei*	*Ischnura senegalensis*	*Orthetrum icteromelas*
Agriocnemis zerafica	*Crocothemis divisa*	*Lestes dissimulans*	*Orthetrum julia*
Allocnemis elongata	*Crocothemis erythraea*	*Lestes ictericus*	*Orthetrum latihami*
Allocnemis flavipennis	*Crocothemis sanguinolenta*	*Lestes ochraceus*	*Orthetrum microstigma*
Allocnemis subnodalis	*Cyanothemis simpsoni*	*Lestes pallidus*	*Orthetrum monardi*
Anax chloromelas	*Diastatomma gamblesi*	*Lestes tridens*	*Orthetrum stemmale*
Anax ephippiger	*Diplacodes lefebvrii*	*Lestinogomphus matilei*	*Orthetrum trinacria*
Anax imperator	*Diplacodes luminans*	*Malgassophlebia bispina*	*Oxythemis phoenicosceles*
Anax rutherfordi	*Elattoneura acuta*	*Mesocnemis robusta*	*Palpopleura deceptor*
Anax tristis	*Elattoneura balli*	*Mesocnemis singularis*	*Palpopleura lucia*
Azuragrion buchholzi	*Elattoneura girardi*	*Neodythemis klingi*	*Palpopleura portia*
Azuragrion vansomereni	*Elattoneura nigra*	*Neophya rutherfordi*	*Pantala flavescens*
Brachythemis impartita	*Elattoneura pruinosa*	*Nesciothemis minor*	*Paragomphus genei*
Brachythemis lacustris	*Eleuthemis buettikoferi*	*Nesciothemis nigeriensis*	*Paragomphus serrulatus*
Brachythemis leucosticta	*Gomphidia bredoi*	*Nesciothemis pujoli*	*Parazyxomma flavicans*
Bradinopyga strachani	*Gomphidia gamblesi*	*Neurogomphus featheri*	*Phaon camerunensis*
Ceriagrion bakeri	*Gynacantha africana*	*Neurogomphus fuscifrons*	*Phaon iridipennis*
Ceriagrion corallinum	*Gynacantha bullata*	*Neurolestes nigeriensis*	*Phyllomacromia aeneothorax*
Ceriagrion glabrum	*Gynacantha cylindrata*	*Notiothemis robertsi*	*Phyllomacromia contumax*
Ceriagrion rubellocerinum	*Gynacantha manderica*	*Nubiolestes diotima*	*Phyllomacromia hervei*
Ceriagrion suave	*Gynacantha nigeriensis*	*Olpogastra lugubris*	*Phyllomacromia melania*

AT0707: Guinean Forest-Savanna Mosaic (*continued*)

Species	Species	Species	Species
Pseudagrion camerunense	*Pseudagrion torridum*	*Tramea limbata*	*Trithetrum navasi*
Pseudagrion emarginatum	*Rhyothemis fenestrina*	*Trithemis aconita*	*Umma cincta*
Pseudagrion epiphonematicum	*Rhyothemis notata*	*Trithemis africana*	*Umma longistigma*
Pseudagrion gigas	*Rhyothemis semihyalina*	*Trithemis annulata*	*Urothemis assignata*
Pseudagrion glaucescens	*Sapho bicolor*	*Trithemis arteriosa*	*Urothemis edwardsii*
Pseudagrion glaucum	*Sapho ciliata*	*Trithemis bifida*	*Zygonoides fraseri*
Pseudagrion hamoni	*Sapho fumosa*	*Trithemis bredoi*	*Zygonyx chrysobaphes*
Pseudagrion hemicolon	*Sapho orichalcea*	*Trithemis dejouxi*	*Zygonyx flavicosta*
Pseudagrion kersteni	*Sympetrum fonscolombii*	*Trithemis dichroa*	*Zygonyx geminuncus*
Pseudagrion malagasoides	*Tetrathemis camerunensis*	*Trithemis grouti*	*Zygonyx natalensis*
Pseudagrion melanicterum	*Tetrathemis godiardi*	*Trithemis hecate*	*Zygonyx torridus*
Pseudagrion nubicum	*Tetrathemis polleni*	*Trithemis imitata*	*Zyxomma atlanticum*
Pseudagrion risi	*Thermochoria equivocata*	*Trithemis kalula*	
Pseudagrion sjoestedti	*Tholymis tillarga*	*Trithemis kirbyi*	
Pseudagrion sublacteum	*Tramea basilaris*	*Trithemis pruinata*	

AT0708: Itigi-Sumbu Thicket (1 species, 2 records)

Species
Pseudagrion nubicum

AT0709: Kalahari Acacia-Baikiaea Woodlands (88 species, 957 records)

Species	Species	Species	Species
Africallagma glaucum	*Chlorolestes fasciatus*	*Olpogastra lugubris*	*Paragomphus genei*
Africallagma sinuatum	*Crocothemis erythraea*	*Orthetrum abbotti*	*Phaon iridipennis*
Agriocnemis exilis	*Crocothemis sanguinolenta*	*Orthetrum brachiale*	*Phyllomacromia contumax*
Agriocnemis gratiosa	*Diplacodes lefebvrii*	*Orthetrum caffrum*	*Phyllomacromia picta*
Agriocnemis pinheyi	*Diplacodes luminans*	*Orthetrum chrysostigma*	*Platycypha caligata*
Anax ephippiger	*Elattoneura glauca*	*Orthetrum guineense*	*Pseudagrion acaciae*
Anax imperator	*Ictinogomphus ferox*	*Orthetrum hintzi*	*Pseudagrion coeleste*
Anax speratus	*Ischnura senegalensis*	*Orthetrum julia*	*Pseudagrion commoniae*
Anax tristis	*Lestes dissimulans*	*Orthetrum machadoi*	*Pseudagrion deningi*
Azuragrion nigridorsum	*Lestes pallidus*	*Orthetrum trinacria*	*Pseudagrion hamoni*
Brachythemis leucosticta	*Lestes pinheyi*	*Palpopleura deceptor*	*Pseudagrion kersteni*
Brachythemis wilsoni	*Lestes plagiatus*	*Palpopleura jucunda*	*Pseudagrion makabusiense*
Bradinopyga cornuta	*Lestes tridens*	*Palpopleura lucia*	*Pseudagrion massaicum*
Ceratogomphus pictus	*Lestes virgatus*	*Palpopleura portia*	*Pseudagrion salisburyense*
Ceriagrion glabrum	*Mesocnemis singularis*	*Pantala flavescens*	*Pseudagrion sjoestedti*
Ceriagrion suave	*Nesciothemis farinosa*	*Paragomphus cognatus*	*Pseudagrion spernatum*

AT0709: Kalahari Acacia-Baikiaea Woodlands (*continued*)

Species	Species	Species	Species
Pseudagrion sublacteum	*Tramea limbata*	*Trithemis hecate*	*Urothemis assignata*
Pseudagrion sudanicum	*Trithemis annulata*	*Trithemis kirbyi*	*Urothemis edwardsii*
Rhyothemis semihyalina	*Trithemis arteriosa*	*Trithemis monardi*	*Zosteraeschna minuscula*
Sympetrum fonscolombii	*Trithemis donaldsoni*	*Trithemis pluvialis*	*Zygonoides fuelleborni*
Tholymis tillarga	*Trithemis dorsalis*	*Trithemis stictica*	*Zygonyx natalensis*
Tramea basilaris	*Trithemis furva*	*Trithetrum navasi*	*Zygonyx torridus*

AT0710: Mandara Plateau Mosaic (15 species, 40 records)

Species	Species	Species	Species
Agriocnemis exilis	*Diplacodes lefebvrii*	*Orthetrum monardi*	*Trithemis arteriosa*
Ceriagrion suave	*Lestes pallidus*	*Palpopleura jucunda*	*Trithemis dichroa*
Crenigomphus renei	*Orthetrum chrysostigma*	*Pseudagrion hamoni*	*Trithemis kirbyi*
Crocothemis erythraea	*Orthetrum guineense*	*Pseudagrion kersteni*	

AT0711: Northern Acacia-Commiphora Bushlands and Thickets (128 species, 1 456 records)

Species	Species	Species	Species
Aethriamanta rezia	*Bradinopyga strachani*	*Lestes pallidus*	*Palpopleura jucunda*
Africallagma elongatum	*Ceriagrion glabrum*	*Lestes plagiatus*	*Palpopleura lucia*
Africallagma glaucum	*Ceriagrion kordofanicum*	*Lestes uncifer*	*Palpopleura portia*
Africallagma pseudelongatum	*Ceriagrion suave*	*Lestes virgatus*	*Pantala flavescens*
Africallagma subtile	*Chalcostephia flavifrons*	*Lestinogomphus angustus*	*Paragomphus alluaudi*
Agriocnemis exilis	*Crenigomphus hartmanni*	*Mesocnemis singularis*	*Paragomphus cognatus*
Agriocnemis gratiosa	*Crenigomphus renei*	*Nesciothemis farinosa*	*Paragomphus elpidius*
Agriocnemis inversa	*Crocothemis divisa*	*Notiothemis jonesi*	*Paragomphus genei*
Agriocnemis sania	*Crocothemis erythraea*	*Notogomphus dorsalis*	*Paragomphus magnus*
Allocnemis abbotti	*Crocothemis sanguinolenta*	*Notogomphus kilimandjaricus*	*Paragomphus pumilio*
Anaciaeschna triangulifera	*Diplacodes deminuta*	*Olpogastra lugubris*	*Paragomphus sabicus*
Anax ephippiger	*Diplacodes lefebvrii*	*Orthetrum abbotti*	*Phaon iridipennis*
Anax imperator	*Diplacodes luminans*	*Orthetrum brachiale*	*Phyllogomphus selysi*
Anax speratus	*Elattoneura glauca*	*Orthetrum caffrum*	*Phyllomacromia contumax*
Anax tristis	*Gomphidia quarrei*	*Orthetrum chrysostigma*	*Phyllomacromia monoceros*
Atoconeura kenya	*Gynacantha manderica*	*Orthetrum guineense*	*Phyllomacromia pallidinervis*
Azuragrion nigridorsum	*Gynacantha villosa*	*Orthetrum hintzi*	*Phyllomacromia picta*
Brachythemis impartita	*Ictinogomphus ferox*	*Orthetrum julia*	*Pinheyschna meruensis*
Brachythemis lacustris	*Ischnura senegalensis*	*Orthetrum machadoi*	*Pinheyschna rileyi*
Brachythemis leucosticta	*Lestes dissimulans*	*Orthetrum stemmale*	*Platycypha amboniensis*
Brachythemis wilsoni	*Lestes ictericus*	*Orthetrum trinacria*	*Platycypha caligata*
Bradinopyga cornuta	*Lestes ochraceus*	*Palpopleura deceptor*	*Proischnura subfurcata*

AT0711: Northern Acacia-Commiphora Bushlands and Thickets (*continued*)

Species	Species	Species	Species
Pseudagrion bicoerulans	*Pseudagrion salisburyense*	*Tramea basilaris*	*Trithemis pluvialis*
Pseudagrion commoniae	*Pseudagrion sjoestedti*	*Trithemis aconita*	*Trithemis stictica*
Pseudagrion gamblesi	*Pseudagrion spernatum*	*Trithemis annulata*	*Trithemis werneri*
Pseudagrion hageni	*Pseudagrion sublacteum*	*Trithemis arteriosa*	*Urothemis assignata*
Pseudagrion hamoni	*Pseudagrion torridum*	*Trithemis dichroa*	*Urothemis edwardsii*
Pseudagrion kersteni	*Rhyothemis fenestrina*	*Trithemis donaldsoni*	*Zosteraeschna ellioti*
Pseudagrion lindicum	*Rhyothemis semihyalina*	*Trithemis furva*	*Zosteraeschna usambarica*
Pseudagrion massaicum	*Sympetrum fonscolombii*	*Trithemis hecate*	*Zygonoides fuelleborni*
Pseudagrion niloticum	*Tetrathemis polleni*	*Trithemis imitata*	*Zygonyx natalensis*
Pseudagrion nubicum	*Tholymis tillarga*	*Trithemis kirbyi*	*Zygonyx torridus*

AT0712: Northern Congolian Forest-Savanna Mosaic (207 species, 730 records)

Species	Species	Species	Species
Aciagrion africanum	*Atoconeura luxata*	*Diastatomma selysi*	*Hemistigma albipunctum*
Aciagrion gracile	*Azuragrion vansomereni*	*Diplacodes deminuta*	*Ictinogomphus ferox*
Acisoma inflatum	*Brachythemis impartita*	*Diplacodes lefebvrii*	*Ictinogomphus regisalberti*
Acisoma trifidum	*Brachythemis lacustris*	*Diplacodes luminans*	*Idomacromia proavita*
Aethiothemis bella	*Brachythemis wilsoni*	*Elattoneura acuta*	*Lestes dissimulans*
Aethiothemis erythromelas	*Bradinopyga strachani*	*Elattoneura centrafricana*	*Lestes ochraceus*
Aethiothemis incongruens	*Ceriagrion annulatum*	*Elattoneura glauca*	*Lestes plagiatus*
Aethiothemis solitaria	*Ceriagrion bakeri*	*Elattoneura lindleyi*	*Lestes uncifer*
Aethriamanta rezia	*Ceriagrion corallinum*	*Elattoneura lliba*	*Lestinogomphus congoensis*
Africallagma subtile	*Ceriagrion glabrum*	*Elattoneura nigra*	*Malgassophlebia bispina*
Africallagma vaginale	*Ceriagrion suave*	*Elattoneura vittata*	*Mesocnemis singularis*
Agriocnemis exilis	*Ceriagrion tricrenaticeps*	*Elattoneura vrijdaghi*	*Micromacromia camerunica*
Agriocnemis forcipata	*Ceriagrion varians*	*Gomphidia bredoi*	*Neodythemis afra*
Agriocnemis gratiosa	*Ceriagrion whellani*	*Gynacantha africana*	*Neodythemis klingi*
Agriocnemis maclachlani	*Chalcostephia flavifrons*	*Gynacantha bullata*	*Neodythemis preussi*
Agriocnemis victoria	*Chlorocypha aphrodite*	*Gynacantha cylindrata*	*Nesciothemis farinosa*
Agriocnemis zerafica	*Chlorocypha cancellata*	*Gynacantha manderica*	*Nesciothemis minor*
Allocnemis contraria	*Chlorocypha curta*	*Gynacantha sextans*	*Nesciothemis nigeriensis*
Allocnemis cyanura	*Chlorocypha cyanifrons*	*Gynacantha vesiculata*	*Nesciothemis pujoli*
Allocnemis nigripes	*Chlorocypha rubida*	*Hadrothemis camarensis*	*Neurogomphus uelensis*
Allocnemis pauli	*Chlorocypha trifaria*	*Hadrothemis coacta*	*Notiothemis robertsi*
Anax chloromelas	*Chlorocypha victoriae*	*Hadrothemis defecta*	*Notogomphus leroyi*
Anax congoliath	*Copera nyansana*	*Hadrothemis infesta*	*Notogomphus moorei*
Anax ephippiger	*Crenigomphus hartmanni*	*Hadrothemis versuta*	*Notogomphus spinosus*
Anax imperator	*Crocothemis divisa*	*Hadrothemis vrijdaghi*	*Olpogastra lugubris*
Anax speratus	*Crocothemis erythraea*	*Heliaeschna fuliginosa*	*Orthetrum abbotti*
Anax tristis	*Crocothemis sanguinolenta*	*Heliaeschna sembe*	*Orthetrum africanum*

AT0712: Northern Congolian Forest-Savanna Mosaic (*continued*)

Species	Species	Species	Species
Orthetrum angustiventre	*Paragomphus genei*	*Pseudagrion hamoni*	*Trithemis apicalis*
Orthetrum austeni	*Paragomphus nigroviridis*	*Pseudagrion isidromorai*	*Trithemis arteriosa*
Orthetrum brachiale	*Paragomphus serrulatus*	*Pseudagrion kersteni*	*Trithemis bredoi*
Orthetrum caffrum	*Paragomphus viridior*	*Pseudagrion kibalense*	*Trithemis dejouxi*
Orthetrum camerunense	*Parazyxomma flavicans*	*Pseudagrion melanicterum*	*Trithemis dichroa*
Orthetrum chrysostigma	*Phaon camerunensis*	*Pseudagrion nubicum*	*Trithemis furva*
Orthetrum guineense	*Phaon iridipennis*	*Pseudagrion risi*	*Trithemis grouti*
Orthetrum hintzi	*Phyllogomphus annulus*	*Pseudagrion serrulatum*	*Trithemis imitata*
Orthetrum icteromelas	*Phyllomacromia aureozona*	*Pseudagrion sjoestedti*	*Trithemis kalula*
Orthetrum julia	*Phyllomacromia insignis*	*Pseudagrion spernatum*	*Trithemis kirbyi*
Orthetrum latihami	*Phyllomacromia maesi*	*Pseudagrion sublacteum*	*Trithemis nuptialis*
Orthetrum machadoi	*Phyllomacromia melania*	*Pseudagrion thenartum*	*Trithemis pruinata*
Orthetrum microstigma	*Phyllomacromia paula*	*Rhyothemis fenestrina*	*Trithemis stictica*
Orthetrum monardi	*Phyllomacromia picta*	*Rhyothemis semihyalina*	*Trithemis tropicana*
Orthetrum saegeri	*Platycypha caligata*	*Sapho bicolor*	*Umma longistigma*
Orthetrum stemmale	*Platycypha lacustris*	*Sapho gloriosa*	*Umma saphirina*
Orthetrum trinacria	*Porpax asperipes*	*Tetrathemis camerunensis*	*Urothemis assignata*
Oxythemis phoenicosceles	*Porpax bipunctus*	*Tetrathemis polleni*	*Urothemis edwardsii*
Palpopleura deceptor	*Porpax garambensis*	*Thermochoria equivocata*	*Zosteraeschna ellioti*
Palpopleura jucunda	*Porpax sentipes*	*Tholymis tillarga*	*Zygonoides fraseri*
Palpopleura lucia	*Proischnura subfurcata*	*Tramea basilaris*	*Zygonyx flavicosta*
Palpopleura portia	*Pseudagrion emarginatum*	*Tramea limbata*	*Zygonyx regisalberti*
Pantala flavescens	*Pseudagrion glaucescens*	*Trithemis aconita*	*Zygonyx torridus*
Paragomphus cognatus	*Pseudagrion glaucum*	*Trithemis aenea*	*Zyxomma atlanticum*
Paragomphus elpidius	*Pseudagrion hageni*	*Trithemis annulata*	

AT0713: Sahelian Acacia Savanna (79 species, 989 records)

Species	Species	Species	Species
Agriocnemis exilis	*Ceriagrion glabrum*	*Ischnura evansi*	*Orthetrum caffrum*
Agriocnemis inversa	*Ceriagrion kordofanicum*	*Ischnura saharensis*	*Orthetrum chrysostigma*
Agriocnemis zerafica	*Ceriagrion suave*	*Ischnura senegalensis*	*Orthetrum hintzi*
Anax ephippiger	*Chlorocypha consueta*	*Lestes dissimulans*	*Orthetrum icteromelas*
Anax imperator	*Chlorocypha curta*	*Lestes ictericus*	*Orthetrum julia*
Anax parthenope	*Crocothemis divisa*	*Lestes pallidus*	*Orthetrum ransonnetii*
Anax speratus	*Crocothemis erythraea*	*Mesocnemis robusta*	*Orthetrum sabina*
Anax tristis	*Crocothemis sanguinolenta*	*Nesciothemis farinosa*	*Orthetrum trinacria*
Azuragrion vansomereni	*Diplacodes lefebvrii*	*Neurogomphus featheri*	*Palpopleura deceptor*
Brachythemis impartita	*Diplacodes luminans*	*Olpogastra lugubris*	*Palpopleura jucunda*
Brachythemis leucosticta	*Hemistigma albipunctum*	*Orthetrum abbotti*	*Palpopleura lucia*
Bradinopyga strachani	*Ictinogomphus ferox*	*Orthetrum brachiale*	*Pantala flavescens*

AT0713: Sahelian Acacia Savanna (*continued*)

Species	Species	Species	Species
Paragomphus genei	*Pseudagrion kersteni*	*Pseudagrion torridum*	*Trithemis dichroa*
Paragomphus pumilio	*Pseudagrion massaicum*	*Rhyothemis semihyalina*	*Trithemis dorsalis*
Paragomphus sinaiticus	*Pseudagrion melanicterum*	*Sympetrum fonscolombii*	*Trithemis furva*
Phaon iridipennis	*Pseudagrion niloticum*	*Tholymis tillarga*	*Trithemis kirbyi*
Platycypha caligata	*Pseudagrion nubicum*	*Tramea basilaris*	*Trithemis stictica*
Proischnura subfurcata	*Pseudagrion sjoestedti*	*Tramea limbata*	*Urothemis edwardsii*
Pseudagrion coeleste	*Pseudagrion sublacteum*	*Trithemis annulata*	*Zygonyx torridus*
Pseudagrion hamoni	*Pseudagrion sudanicum*	*Trithemis arteriosa*	

AT0714: Serengeti Volcanic Grasslands (2 species, 2 records)

Species
Orthetrum chrysostigma
Proischnura subfurcata

AT0715: Somalia Acacia-Commiphora Bushlands and Thickets (75 species, 414 records)

Species	Species	Species	Species
Acisoma inflatum	*Crocothemis sanguinolenta*	*Orthetrum sabina*	*Pseudagrion sublacteum*
Acisoma variegatum	*Diplacodes lefebvrii*	*Orthetrum trinacria*	*Pseudagrion torridum*
Africallagma elongatum	*Diplacodes luminans*	*Palpopleura deceptor*	*Rhyothemis semihyalina*
Africallagma subtile	*Gynacantha manderica*	*Palpopleura jucunda*	*Sympetrum fonscolombii*
Agriocnemis exilis	*Hemistigma albipunctum*	*Palpopleura lucia*	*Tetrathemis polleni*
Agriocnemis inversa	*Ictinogomphus ferox*	*Palpopleura portia*	*Tholymis tillarga*
Agriocnemis sania	*Ischnura senegalensis*	*Pantala flavescens*	*Tramea basilaris*
Anaciaeschna triangulifera	*Lestes pallidus*	*Paragomphus genei*	*Tramea limbata*
Anax ephippiger	*Lestes uncifer*	*Phaon iridipennis*	*Trithemis annulata*
Anax imperator	*Nesciothemis farinosa*	*Phyllomacromia pallidinervis*	*Trithemis arteriosa*
Anax parthenope	*Notogomphus ruppeli*	*Phyllomacromia picta*	*Trithemis dejouxi*
Atoconeura aethiopica	*Olpogastra lugubris*	*Pinheyschna waterstoni*	*Trithemis ellenbeckii*
Brachythemis impartita	*Orthetrum abbotti*	*Platycypha caligata*	*Trithemis furva*
Brachythemis lacustris	*Orthetrum brachiale*	*Proischnura subfurcata*	*Trithemis kirbyi*
Brachythemis leucosticta	*Orthetrum caffrum*	*Pseudagrion lindicum*	*Trithemis stictica*
Ceriagrion glabrum	*Orthetrum chrysostigma*	*Pseudagrion massaicum*	*Urothemis assignata*
Ceriagrion suave	*Orthetrum julia*	*Pseudagrion niloticum*	*Urothemis edwardsii*
Crenigomphus renei	*Orthetrum kristenseni*	*Pseudagrion nubicum*	*Zygonyx natalensis*
Crocothemis erythraea	*Orthetrum monardi*	*Pseudagrion spernatum*	

AT0716: Southern Acacia-Commiphora Bushlands and Thickets (89 species, 191 records)

Species	Species	Species	Species
Aethiothemis solitaria	*Elattoneura glauca*	*Palpopleura jucunda*	*Pseudagrion spernatum*
Aethriamanta rezia	*Gynacantha villosa*	*Palpopleura lucia*	*Pseudagrion sublacteum*
Africallagma elongatum	*Hadrothemis scabrifrons*	*Palpopleura portia*	*Pseudagrion torridum*
Africallagma glaucum	*Hemistigma albipunctum*	*Pantala flavescens*	*Rhyothemis semihyalina*
Agriocnemis exilis	*Ictinogomphus ferox*	*Paragomphus alluaudi*	*Tetrathemis polleni*
Agriocnemis gratiosa	*Ischnura senegalensis*	*Paragomphus cognatus*	*Tholymis tillarga*
Allocnemis abbotti	*Lestes amicus*	*Paragomphus genei*	*Trithemis annulata*
Anaciaeschna triangulifera	*Lestes dissimulans*	*Phaon iridipennis*	*Trithemis arteriosa*
Anax ephippiger	*Lestes plagiatus*	*Phyllogomphus selysi*	*Trithemis donaldsoni*
Anax imperator	*Lestes tridens*	*Phyllomacromia contumax*	*Trithemis furva*
Atoconeura biordinata	*Lestes uncifer*	*Phyllomacromia picta*	*Trithemis kirbyi*
Brachythemis impartita	*Mesocnemis singularis*	*Platycypha caligata*	*Trithemis pluvialis*
Brachythemis lacustris	*Nesciothemis farinosa*	*Pseudagrion acaciae*	*Trithemis stictica*
Brachythemis leucosticta	*Neurogomphus featheri*	*Pseudagrion commoniae*	*Trithemis werneri*
Bradinopyga cornuta	*Notogomphus leroyi*	*Pseudagrion gamblesi*	*Trithetrum navasi*
Ceriagrion glabrum	*Orthetrum abbotti*	*Pseudagrion glaucescens*	*Urothemis edwardsii*
Ceriagrion suave	*Orthetrum brachiale*	*Pseudagrion hamoni*	*Zosteraeschna usambarica*
Chalcostephia flavifrons	*Orthetrum chrysostigma*	*Pseudagrion kersteni*	*Zygonoides fuelleborni*
Crenigomphus hartmanni	*Orthetrum hintzi*	*Pseudagrion lindicum*	*Zygonyx natalensis*
Crenigomphus renei	*Orthetrum julia*	*Pseudagrion massaicum*	*Zygonyx torridus*
Crocothemis divisa	*Orthetrum stemmale*	*Pseudagrion melanicterum*	
Crocothemis erythraea	*Orthetrum trinacria*	*Pseudagrion nubicum*	
Diplacodes lefebvrii	*Palpopleura deceptor*	*Pseudagrion sjoestedti*	

AT0717: Southern Africa Bushveld (126 species, 5 320 records)

Species	Species	Species	Species
Aciagrion dondoense	*Anax imperator*	*Chlorolestes tessellatus*	*Ictinogomphus ferox*
Aciagrion gracile	*Anax speratus*	*Crenigomphus hartmanni*	*Ischnura senegalensis*
Acisoma variegatum	*Anax tristis*	*Crocothemis divisa*	*Lestes dissimulans*
Aethriamanta rezia	*Azuragrion nigridorsum*	*Crocothemis erythraea*	*Lestes ochraceus*
Africallagma fractum	*Brachythemis lacustris*	*Crocothemis sanguinolenta*	*Lestes pallidus*
Africallagma glaucum	*Brachythemis leucosticta*	*Crocothemis saxicolor*	*Lestes plagiatus*
Africallagma sapphirinum	*Bradinopyga cornuta*	*Diplacodes lefebvrii*	*Lestes tridens*
Agriocnemis exilis	*Ceratogomphus pictus*	*Diplacodes luminans*	*Lestes uncifer*
Agriocnemis falcifera	*Ceriagrion glabrum*	*Diplacodes pumila*	*Lestes virgatus*
Agriocnemis pinheyi	*Ceriagrion suave*	*Elattoneura frenulata*	*Lestinogomphus angustus*
Allocnemis leucosticta	*Ceriagrion whellani*	*Elattoneura glauca*	*Mesocnemis singularis*
Allocnemis marshalli	*Chlorocypha consueta*	*Gomphidia quarrei*	*Nesciothemis farinosa*
Anaciaeschna triangulifera	*Chlorolestes elegans*	*Gynacantha manderica*	*Notiothemis jonesi*
Anax ephippiger	*Chlorolestes fasciatus*	*Hemistigma albipunctum*	*Notogomphus praetorius*

AT0717: Southern Africa Bushveld (*continued*)

Species	Species	Species	Species
Olpogastra lugubris	*Paragomphus elpidius*	*Pseudagrion hamoni*	*Trithemis donaldsoni*
Orthetrum abbotti	*Paragomphus genei*	*Pseudagrion kersteni*	*Trithemis dorsalis*
Orthetrum brachiale	*Paragomphus sabicus*	*Pseudagrion makabusiense*	*Trithemis furva*
Orthetrum caffrum	*Phaon iridipennis*	*Pseudagrion massaicum*	*Trithemis hecate*
Orthetrum chrysostigma	*Phyllogomphus selysi*	*Pseudagrion nubicum*	*Trithemis kirbyi*
Orthetrum guineense	*Phyllomacromia contumax*	*Pseudagrion salisburyense*	*Trithemis pluvialis*
Orthetrum hintzi	*Phyllomacromia monoceros*	*Pseudagrion spernatum*	*Trithemis stictica*
Orthetrum icteromelas	*Phyllomacromia picta*	*Pseudagrion sublacteum*	*Trithemis werneri*
Orthetrum julia	*Pinheyschna subpupillata*	*Pseudagrion sudanicum*	*Urothemis assignata*
Orthetrum machadoi	*Platycypha caligata*	*Rhyothemis semihyalina*	*Urothemis edwardsii*
Orthetrum stemmale	*Proischnura rotundipennis*	*Sympetrum fonscolombii*	*Zosteraeschna minuscula*
Orthetrum trinacria	*Proischnura subfurcata*	*Tetrathemis polleni*	*Zosteraeschna usambarica*
Palpopleura deceptor	*Pseudagrion acaciae*	*Tholymis tillarga*	*Zygonoides fuelleborni*
Palpopleura jucunda	*Pseudagrion assegaii*	*Tramea basilaris*	*Zygonyx natalensis*
Palpopleura lucia	*Pseudagrion caffrum*	*Tramea limbata*	*Zygonyx torridus*
Palpopleura portia	*Pseudagrion coeleste*	*Trithemis aconita*	*Zyxomma atlanticum*
Pantala flavescens	*Pseudagrion commoniae*	*Trithemis annulata*	
Paragomphus cognatus	*Pseudagrion hageni*	*Trithemis arteriosa*	

AT0718: Southern Congolian Forest-Savanna Mosaic (124 species, 445 records)

Species	Species	Species	Species
Acisoma trifidum	*Chalcostephia flavifrons*	*Gynacantha manderica*	*Nesciothemis farinosa*
Aethiothemis ellioti	*Chlorocypha fabamacula*	*Gynacantha sextans*	*Notogomphus leroyi*
Aethiothemis solitaria	*Chlorocypha frigida*	*Gynacantha vesiculata*	*Notogomphus praetorius*
Aethriamanta rezia	*Chlorocypha trifaria*	*Hadrothemis camarensis*	*Olpogastra lugubris*
Afroaeschna scotias	*Copera nyansana*	*Hadrothemis coacta*	*Orthetrum abbotti*
Agriocnemis exilis	*Crocothemis divisa*	*Hadrothemis defecta*	*Orthetrum austeni*
Agriocnemis forcipata	*Crocothemis erythraea*	*Hadrothemis infesta*	*Orthetrum brachiale*
Allocnemis nigripes	*Crocothemis sanguinolenta*	*Hadrothemis scabrifrons*	*Orthetrum chrysostigma*
Anax ephippiger	*Cyanothemis simpsoni*	*Hadrothemis versuta*	*Orthetrum guineense*
Anax imperator	*Diastatomma selysi*	*Heliaeschna cynthiae*	*Orthetrum hintzi*
Anax speratus	*Diastatomma soror*	*Heliaeschna fuliginosa*	*Orthetrum julia*
Anax tristis	*Diplacodes deminuta*	*Heliaeschna sembe*	*Orthetrum machadoi*
Azuragrion nigridorsum	*Diplacodes lefebvrii*	*Hemistigma albipunctum*	*Orthetrum macrostigma*
Brachythemis lacustris	*Diplacodes luminans*	*Ictinogomphus regisalberti*	*Orthetrum microstigma*
Brachythemis leucosticta	*Elattoneura centrafricana*	*Lestes amicus*	*Orthetrum monardi*
Ceriagrion corallinum	*Elattoneura lliba*	*Lestinogomphus congoensis*	*Orthetrum saegeri*
Ceriagrion glabrum	*Gomphidia quarrei*	*Micromacromia camerunica*	*Orthetrum stemmale*
Ceriagrion tricrenaticeps	*Gynacantha bullata*	*Neodythemis preussi*	*Orthetrum trinacria*
Ceriagrion varians	*Gynacantha cylindrata*	*Neophya rutherfordi*	*Oxythemis phoenicosceles*

AT0718: Southern Congolian Forest-Savanna Mosaic (*continued*)

Species	Species	Species	Species
Palpopleura jucunda	*Phyllomacromia unifasciata*	*Rhyothemis mariposa*	*Trithemis stictica*
Palpopleura lucia	*Platycypha caligata*	*Tetrathemis camerunensis*	*Umma electa*
Palpopleura portia	*Platycypha lacustris*	*Thermochoria equivocata*	*Umma longistigma*
Pantala flavescens	*Porpax asperipes*	*Tholymis tillarga*	*Umma saphirina*
Paragomphus cognatus	*Pseudagrion acaciae*	*Tramea basilaris*	*Urothemis assignata*
Phaon camerunensis	*Pseudagrion angolense*	*Trithemis annulata*	*Urothemis edwardsii*
Phaon iridipennis	*Pseudagrion glaucescens*	*Trithemis arteriosa*	*Zygonoides occidentis*
Phyllogomphus annulus	*Pseudagrion hageni*	*Trithemis congolica*	*Zygonyx eusebia*
Phyllogomphus selysi	*Pseudagrion kersteni*	*Trithemis dichroa*	*Zygonyx flavicosta*
Phyllomacromia aureozona	*Pseudagrion kibalense*	*Trithemis furva*	*Zygonyx natalensis*
Phyllomacromia melania	*Pseudagrion melanicterum*	*Trithemis imitata*	*Zygonyx regisalberti*
Phyllomacromia paula	*Rhyothemis fenestrina*	*Trithemis nuptialis*	*Zygonyx torridus*

AT0719: Southern Miombo Woodlands (142 species, 1 971 records)

Species	Species	Species	Species
Aciagrion gracile	*Ceriagrion suave*	*Lestes ochraceus*	*Orthetrum stemmale*
Acisoma inflatum	*Ceriagrion whellani*	*Lestes pallidus*	*Orthetrum trinacria*
Acisoma variegatum	*Chlorocypha consueta*	*Lestes pinheyi*	*Palpopleura deceptor*
Aethiothemis ellioti	*Chlorolestes elegans*	*Lestes plagiatus*	*Palpopleura jucunda*
Aethriamanta rezia	*Crenigomphus hartmanni*	*Lestes tridens*	*Palpopleura lucia*
Africallagma fractum	*Crocothemis divisa*	*Lestes virgatus*	*Palpopleura portia*
Africallagma glaucum	*Crocothemis erythraea*	*Lestinogomphus angustus*	*Pantala flavescens*
Africallagma pallidulum	*Crocothemis sanguinolenta*	*Mesocnemis singularis*	*Paragomphus cognatus*
Africallagma sinuatum	*Crocothemis saxicolor*	*Microgomphus nyassicus*	*Paragomphus elpidius*
Africallagma subtile	*Diplacodes deminuta*	*Nesciothemis farinosa*	*Paragomphus genei*
Agriocnemis exilis	*Diplacodes lefebvrii*	*Notiothemis jonesi*	*Paragomphus magnus*
Agriocnemis gratiosa	*Diplacodes luminans*	*Notogomphus dendrohyrax*	*Paragomphus sabicus*
Agriocnemis pinheyi	*Diplacodes pumila*	*Notogomphus praetorius*	*Phaon iridipennis*
Allocnemis marshalli	*Elattoneura cellularis*	*Notogomphus zernyi*	*Phyllomacromia contumax*
Anax ephippiger	*Elattoneura glauca*	*Olpogastra lugubris*	*Phyllomacromia monoceros*
Anax imperator	*Eleuthemis quadrigutta*	*Onychogomphus supinus*	*Phyllomacromia picta*
Anax speratus	*Gomphidia quarrei*	*Orthetrum abbotti*	*Pinheyschna rileyi*
Anax tristis	*Gynacantha manderica*	*Orthetrum brachiale*	*Pinheyschna subpupillata*
Atoconeura biordinata	*Hadrothemis scabrifrons*	*Orthetrum caffrum*	*Platycypha caligata*
Azuragrion nigridorsum	*Hemistigma albipunctum*	*Orthetrum chrysostigma*	*Platycypha fitzsimonsi*
Brachythemis lacustris	*Ictinogomphus ferox*	*Orthetrum guineense*	*Platycypha inyangae*
Brachythemis leucosticta	*Ischnura senegalensis*	*Orthetrum hintzi*	*Porpax risi*
Bradinopyga cornuta	*Lestes amicus*	*Orthetrum icteromelas*	*Proischnura subfurcata*
Ceratogomphus pictus	*Lestes dissimulans*	*Orthetrum julia*	*Pseudagrion acaciae*
Ceriagrion glabrum	*Lestes ictericus*	*Orthetrum machadoi*	*Pseudagrion assegaii*

AT0719: Southern Miombo Woodlands (*continued*)

Species	Species	Species	Species
Pseudagrion coeleste	*Pseudagrion rufostigma*	*Tramea basilaris*	*Trithemis pluvialis*
Pseudagrion commoniae	*Pseudagrion salisburyense*	*Tramea limbata*	*Trithemis stictica*
Pseudagrion gamblesi	*Pseudagrion sjoestedti*	*Trithemis aconita*	*Trithemis werneri*
Pseudagrion glaucescens	*Pseudagrion spernatum*	*Trithemis annulata*	*Urothemis assignata*
Pseudagrion hageni	*Pseudagrion sublacteum*	*Trithemis arteriosa*	*Urothemis edwardsii*
Pseudagrion hamoni	*Pseudagrion sudanicum*	*Trithemis donaldsoni*	*Zosteraeschna usambarica*
Pseudagrion inconspicuum	*Pseudagrion vumbaense*	*Trithemis dorsalis*	*Zygonoides fuelleborni*
Pseudagrion kersteni	*Rhyothemis semihyalina*	*Trithemis furva*	*Zygonyx natalensis*
Pseudagrion makabusiense	*Sympetrum fonscolombii*	*Trithemis hecate*	*Zygonyx torridus*
Pseudagrion massaicum	*Tetrathemis polleni*	*Trithemis kirbyi*	
Pseudagrion nubicum	*Tholymis tillarga*	*Trithemis monardi*	

AT0721: Victoria Basin Forest-Savanna Mosaic (194 species, 3 195 records)

Species	Species	Species	Species
Aciagrion africanum	*Atoconeura eudoxia*	*Crenigomphus renei*	*Hemicordulia africana*
Aciagrion gracile	*Atoconeura kenya*	*Crocothemis divisa*	*Hemistigma albipunctum*
Acisoma trifidum	*Atoconeura pseudeudoxia*	*Crocothemis erythraea*	*Ictinogomphus ferox*
Aethriamanta rezia	*Azuragrion nigridorsum*	*Crocothemis sanguinolenta*	*Ischnura senegalensis*
Africallagma elongatum	*Brachythemis impartita*	*Diplacodes deminuta*	*Lestes dissimulans*
Africallagma glaucum	*Brachythemis lacustris*	*Diplacodes lefebvrii*	*Lestes pallidus*
Africallagma pseudelongatum	*Brachythemis leucosticta*	*Diplacodes luminans*	*Lestes plagiatus*
Africallagma subtile	*Brachythemis wilsoni*	*Elattoneura glauca*	*Lestes uncifer*
Africallagma vaginale	*Bradinopyga cornuta*	*Elattoneura nigra*	*Lestes virgatus*
Afroaeschna scotias	*Bradinopyga strachani*	*Elattoneura vittata*	*Lestinogomphus angustus*
Agriocnemis exilis	*Ceriagrion bakeri*	*Gomphidia bredoi*	*Malgassophlebia bispina*
Agriocnemis gratiosa	*Ceriagrion corallinum*	*Gynacantha africana*	*Mesocnemis singularis*
Agriocnemis inversa	*Ceriagrion glabrum*	*Gynacantha bullata*	*Micromacromia camerunica*
Agriocnemis maclachlani	*Ceriagrion kordofanicum*	*Gynacantha cylindrata*	*Neodythemis munyaga*
Agriocnemis palaeforma	*Ceriagrion platystigma*	*Gynacantha manderica*	*Nesciothemis farinosa*
Agriocnemis victoria	*Ceriagrion suave*	*Gynacantha nigeriensis*	*Notiothemis jonesi*
Agriocnemis zerafica	*Ceriagrion varians*	*Gynacantha vesiculata*	*Notiothemis robertsi*
Allocnemis nigripes	*Ceriagrion whellani*	*Gynacantha victoriae*	*Notogomphus dorsalis*
Allocnemis pauli	*Chalcostephia flavifrons*	*Gynacantha villosa*	*Notogomphus lecythus*
Allocnemis superba	*Chlorocypha cancellata*	*Hadrothemis camarensis*	*Notogomphus leroyi*
Anaciaeschna triangulifera	*Chlorocypha curta*	*Hadrothemis coacta*	*Notogomphus lujai*
Anax chloromelas	*Chlorocypha trifaria*	*Hadrothemis defecta*	*Notogomphus maathaiae*
Anax ephippiger	*Chlorocypha victoriae*	*Hadrothemis infesta*	*Olpogastra lugubris*
Anax imperator	*Copera nyansana*	*Heliaeschna cynthiae*	*Onychogomphus styx*
Anax speratus	*Copera sikassoensis*	*Heliaeschna fuliginosa*	*Orthetrum abbotti*
Anax tristis	*Crenigomphus hartmanni*	*Heliaeschna ugandica*	*Orthetrum austeni*

AT0721: Victoria Basin Forest-Savanna Mosaic (*continued*)

Species	Species	Species	Species
Orthetrum brachiale	*Parazyxomma flavicans*	*Pseudagrion nubicum*	*Trithemis dichroa*
Orthetrum caffrum	*Phaon iridipennis*	*Pseudagrion rufocinctum*	*Trithemis donaldsoni*
Orthetrum camerunense	*Phyllogomphus selysi*	*Pseudagrion salisburyense*	*Trithemis dorsalis*
Orthetrum chrysostigma	*Phyllomacromia aureozona*	*Pseudagrion sjoestedti*	*Trithemis furva*
Orthetrum guineense	*Phyllomacromia contumax*	*Pseudagrion spernatum*	*Trithemis grouti*
Orthetrum hintzi	*Phyllomacromia funicularioides*	*Pseudagrion sublacteum*	*Trithemis imitata*
Orthetrum icteromelas	*Phyllomacromia melania*	*Pseudagrion sudanicum*	*Trithemis integra*
Orthetrum julia	*Phyllomacromia picta*	*Pseudagrion torridum*	*Trithemis kirbyi*
Orthetrum machadoi	*Phyllomacromia sylvatica*	*Rhyothemis fenestrina*	*Trithemis nuptialis*
Orthetrum microstigma	*Pinheyschna meruensis*	*Rhyothemis semihyalina*	*Trithemis pruinata*
Orthetrum monardi	*Pinheyschna rileyi*	*Stenocypha jacksoni*	*Trithemis stictica*
Orthetrum stemmale	*Platycypha caligata*	*Stenocypha molindica*	*Trithetrum navasi*
Orthetrum trinacria	*Platycypha lacustris*	*Stenocypha tenuis*	*Umma saphirina*
Oxythemis phoenicosceles	*Proischnura subfurcata*	*Tetrathemis camerunensis*	*Urothemis assignata*
Palpopleura deceptor	*Pseudagrion bicoerulans*	*Tetrathemis corduliformis*	*Urothemis edwardsii*
Palpopleura jucunda	*Pseudagrion gamblesi*	*Tetrathemis polleni*	*Zosteraeschna ellioti*
Palpopleura lucia	*Pseudagrion glaucescens*	*Thermochoria equivocata*	*Zygonyx flavicosta*
Palpopleura portia	*Pseudagrion hageni*	*Tholymis tillarga*	*Zygonyx natalensis*
Pantala flavescens	*Pseudagrion hamoni*	*Tramea basilaris*	*Zygonyx regisalberti*
Paragomphus alluaudi	*Pseudagrion kersteni*	*Tramea limbata*	*Zygonyx torridus*
Paragomphus elpidius	*Pseudagrion kibalense*	*Trithemis aconita*	*Zyxomma atlanticum*
Paragomphus genei	*Pseudagrion massaicum*	*Trithemis annulata*	
Paragomphus viridior	*Pseudagrion melanicterum*	*Trithemis arteriosa*	

AT0722: West Sudanian Savanna (137 species, 2 704 records)

Species	Species	Species	Species
Acisoma inflatum	*Anax tristis*	*Chlorocypha luminosa*	*Gynacantha manderica*
Acisoma trifidum	*Azuragrion vansomereni*	*Copera sikassoensis*	*Gynacantha nigeriensis*
Aethiothemis incongruens	*Brachythemis impartita*	*Crenigomphus renei*	*Gynacantha sextans*
Aethriamanta rezia	*Brachythemis lacustris*	*Crocothemis divisa*	*Gynacantha vesiculata*
Africallagma subtile	*Brachythemis leucosticta*	*Crocothemis erythraea*	*Hadrothemis camarensis*
Agriocnemis exilis	*Brachythemis wilsoni*	*Crocothemis sanguinolenta*	*Heliaeschna fuliginosa*
Agriocnemis maclachlani	*Bradinopyga strachani*	*Diplacodes lefebvrii*	*Hemistigma albipunctum*
Agriocnemis victoria	*Ceriagrion corallinum*	*Diplacodes luminans*	*Ictinogomphus ferox*
Agriocnemis zerafica	*Ceriagrion glabrum*	*Elattoneura glauca*	*Ictinogomphus fraseri*
Allocnemis elongata	*Ceriagrion rubellocerinum*	*Elattoneura nigra*	*Ischnura senegalensis*
Allocnemis flavipennis	*Ceriagrion suave*	*Elattoneura vittata*	*Lestes dissimulans*
Anax ephippiger	*Chalcostephia flavifrons*	*Eleuthemis buettikoferi*	*Lestes ictericus*
Anax imperator	*Chlorocypha curta*	*Gomphidia bredoi*	*Lestes ochraceus*
Anax rutherfordi	*Chlorocypha dispar*	*Gynacantha cylindrata*	*Lestes pallidus*

AT0722: West Sudanian Savanna (*continued*)

Species	Species	Species	Species
Lestes pinheyi	*Orthetrum latihami*	*Pseudagrion hamoni*	*Trithemis bredoi*
Lestes plagiatus	*Orthetrum microstigma*	*Pseudagrion kersteni*	*Trithemis dejouxi*
Lestes virgatus	*Orthetrum monardi*	*Pseudagrion melanicterum*	*Trithemis dichroa*
Mesocnemis robusta	*Orthetrum stemmale*	*Pseudagrion nubicum*	*Trithemis grouti*
Mesocnemis singularis	*Orthetrum trinacria*	*Pseudagrion sjoestedti*	*Trithemis hecate*
Neodythemis klingi	*Oxythemis phoenicosceles*	*Pseudagrion sublacteum*	*Trithemis imitata*
Nesciothemis minor	*Palpopleura deceptor*	*Pseudagrion sudanicum*	*Trithemis kalula*
Nesciothemis nigeriensis	*Palpopleura jucunda*	*Pseudagrion torridum*	*Trithemis kirbyi*
Nesciothemis pujoli	*Palpopleura lucia*	*Rhyothemis fenestrina*	*Trithemis pruinata*
Neurogomphus featheri	*Palpopleura portia*	*Rhyothemis notata*	*Trithemis stictica*
Olpogastra lugubris	*Pantala flavescens*	*Rhyothemis semihyalina*	*Trithetrum navasi*
Orthetrum abbotti	*Paragomphus genei*	*Sapho ciliata*	*Urothemis assignata*
Orthetrum africanum	*Paragomphus serrulatus*	*Sympetrum fonscolombii*	*Urothemis edwardsii*
Orthetrum angustiventre	*Parazyxomma flavicans*	*Tetrathemis camerunensis*	*Zygonoides fraseri*
Orthetrum austeni	*Phaon iridipennis*	*Tetrathemis polleni*	*Zygonyx flavicosta*
Orthetrum brachiale	*Phyllomacromia contumax*	*Tholymis tillarga*	*Zygonyx natalensis*
Orthetrum chrysostigma	*Pseudagrion camerunense*	*Tramea basilaris*	*Zygonyx torridus*
Orthetrum guineense	*Pseudagrion emarginatum*	*Tramea limbata*	*Zyxomma atlanticum*
Orthetrum hintzi	*Pseudagrion gigas*	*Trithemis aconita*	
Orthetrum icteromelas	*Pseudagrion glaucescens*	*Trithemis annulata*	
Orthetrum julia	*Pseudagrion glaucum*	*Trithemis arteriosa*	

AT0723: Western Congolian Forest-Savanna Mosaic (261 species, 9 149 records)

Species	Species	Species	Species
Aciagrion africanum	*Agriocnemis angolensis*	*Azuragrion buchholzi*	*Chlorocypha aphrodite*
Aciagrion balachowskyi	*Agriocnemis exilis*	*Azuragrion nigridorsum*	*Chlorocypha cancellata*
Aciagrion brosseti	*Agriocnemis forcipata*	*Brachythemis impartita*	*Chlorocypha curta*
Aciagrion nodosum	*Agriocnemis maclachlani*	*Brachythemis lacustris*	*Chlorocypha cyanifrons*
Acisoma inflatum	*Agriocnemis stygia*	*Brachythemis leucosticta*	*Chlorocypha fabamacula*
Acisoma trifidum	*Agriocnemis victoria*	*Bradinopyga strachani*	*Chlorocypha glauca*
Aethiothemis basilewskyi	*Allocnemis cyanura*	*Ceriagrion annulatum*	*Chlorocypha helenae*
Aethiothemis ellioti	*Allocnemis nigripes*	*Ceriagrion bakeri*	*Chlorocypha pyriformosa*
Aethiothemis erythromelas	*Allocnemis pauli*	*Ceriagrion corallinum*	*Chlorocypha rubida*
Aethiothemis mediofasciata	*Anax chloromelas*	*Ceriagrion glabrum*	*Chlorocypha victoriae*
Aethiothemis solitaria	*Anax congoliath*	*Ceriagrion platystigma*	*Copera congolensis*
Aethriamanta rezia	*Anax ephippiger*	*Ceriagrion sakejii*	*Copera nyansana*
Africallagma fractum	*Anax imperator*	*Ceriagrion tricrenaticeps*	*Copera rufipes*
Africallagma glaucum	*Anax speratus*	*Ceriagrion varians*	*Cornigomphus guineensis*
Africallagma vaginale	*Anax tristis*	*Ceriagrion whellani*	*Crenigomphus cornutus*
Afroaeschna scotias	*Atoconeura luxata*	*Chalcostephia flavifrons*	*Crocothemis divisa*

AT0723: Western Congolian Forest-Savanna Mosaic (*continued*)

Species	Species	Species	Species
Crocothemis erythraea	*Lestes dissimulans*	*Palpopleura albifrons*	*Pseudagrion greeni*
Crocothemis sanguinolenta	*Lestes ochraceus*	*Palpopleura lucia*	*Pseudagrion grilloti*
Cyanothemis simpsoni	*Lestes pinheyi*	*Palpopleura portia*	*Pseudagrion hamoni*
Diastatomma multilineatum	*Lestes tridens*	*Pantala flavescens*	*Pseudagrion helenae*
Diastatomma selysi	*Lestes uncifer*	*Paragomphus abnormis*	*Pseudagrion hemicolon*
Diastatomma tricolor	*Lestinogomphus congoensis*	*Paragomphus cognatus*	*Pseudagrion inconspicuum*
Diplacodes deminuta	*Libyogomphus tenaculatus*	*Paragomphus machadoi*	*Pseudagrion isidromorai*
Diplacodes lefebvrii	*Malgassophlebia bispina*	*Paragomphus nigroviridis*	*Pseudagrion kersteni*
Diplacodes luminans	*Malgassophlebia westfalli*	*Paragomphus serrulatus*	*Pseudagrion kibalense*
Diplacodes pumila	*Mesocnemis singularis*	*Parazyxomma flavicans*	*Pseudagrion massaicum*
Elattoneura acuta	*Micromacromia camerunica*	*Phaon camerunensis*	*Pseudagrion melanicterum*
Elattoneura glauca	*Micromacromia zygoptera*	*Phaon iridipennis*	*Pseudagrion salisburyense*
Elattoneura incerta	*Neodythemis afra*	*Phyllogomphus annulus*	*Pseudagrion serrulatum*
Elattoneura josemorai	*Neodythemis klingi*	*Phyllogomphus coloratus*	*Pseudagrion simonae*
Elattoneura lliba	*Neodythemis preussi*	*Phyllogomphus selysi*	*Pseudagrion simplicilaminatum*
Elattoneura morini	*Neodythemis takamandensis*	*Phyllomacromia aureozona*	*Pseudagrion sjoestedti*
Elattoneura tsiamae	*Neophya rutherfordi*	*Phyllomacromia bicristulata*	*Pseudagrion sublacteum*
Elattoneura vittata	*Nesciothemis farinosa*	*Phyllomacromia contumax*	*Pseudagrion torridum*
Elattoneura vrijdaghi	*Nesciothemis fitzgeraldi*	*Phyllomacromia hervei*	*Rhyothemis fenestrina*
Eleuthemis buettikoferi	*Nesciothemis nigeriensis*	*Phyllomacromia insignis*	*Rhyothemis notata*
Gomphidia gamblesi	*Neurogomphus alius*	*Phyllomacromia maesi*	*Rhyothemis semihyalina*
Gomphidia quarrei	*Neurolestes trinervis*	*Phyllomacromia melania*	*Sapho bicolor*
Gynacantha bullata	*Notiothemis robertsi*	*Phyllomacromia paula*	*Sapho gloriosa*
Gynacantha cylindrata	*Notogomphus spinosus*	*Platycypha angolensis*	*Sapho orichalcea*
Gynacantha sextans	*Olpogastra lugubris*	*Platycypha lacustris*	*Stenocnemis pachystigma*
Gynacantha vesiculata	*Orthetrum abbotti*	*Platycypha picta*	*Stenocypha gracilis*
Gynacantha victoriae	*Orthetrum africanum*	*Platycypha rufitibia*	*Tetrathemis camerunensis*
Hadrothemis camarensis	*Orthetrum austeni*	*Porpax asperipes*	*Tetrathemis fraseri*
Hadrothemis coacta	*Orthetrum brachiale*	*Porpax bipunctus*	*Tetrathemis longfieldae*
Hadrothemis defecta	*Orthetrum chrysostigma*	*Porpax garambensis*	*Thermochoria equivocata*
Hadrothemis infesta	*Orthetrum guineense*	*Porpax risi*	*Thermochoria jeanneli*
Hadrothemis versuta	*Orthetrum hintzi*	*Porpax sentipes*	*Tholymis tillarga*
Heliaeschna cynthiae	*Orthetrum icteromelas*	*Pseudagrion angolense*	*Tragogomphus ellioti*
Heliaeschna fuliginosa	*Orthetrum julia*	*Pseudagrion bernardi*	*Tramea basilaris*
Heliaeschna sembe	*Orthetrum machadoi*	*Pseudagrion camerunense*	*Trithemis aconita*
Heliaeschna ugandica	*Orthetrum macrostigma*	*Pseudagrion coeruleipunctum*	*Trithemis aenea*
Hemistigma albipunctum	*Orthetrum microstigma*	*Pseudagrion deningi*	*Trithemis apicalis*
Ictinogomphus fraseri	*Orthetrum robustum*	*Pseudagrion epiphonematicum*	*Trithemis arteriosa*
Ictinogomphus regisalberti	*Orthetrum saegeri*	*Pseudagrion estesi*	*Trithemis basitincta*
Idomacromia proavita	*Orthetrum stemmale*	*Pseudagrion glaucescens*	*Trithemis bifida*
Ischnura senegalensis	*Orthetrum trinacria*	*Pseudagrion glaucoideum*	*Trithemis congolica*
Lestes amicus	*Oxythemis phoenicosceles*	*Pseudagrion glaucum*	*Trithemis dichroa*

AT0723: Western Congolian Forest-Savanna Mosaic (*continued*)

Species	Species	Species	Species
Trithemis fumosa	*Trithemis osvaldae*	*Umma electa*	*Zygonyx flavicosta*
Trithemis grouti	*Trithemis pluvialis*	*Umma longistigma*	*Zygonyx natalensis*
Trithemis hartwigi	*Trithemis pruinata*	*Umma mesostigma*	*Zygonyx regisalberti*
Trithemis hecate	*Trithemis stictica*	*Umma saphirina*	*Zygonyx torridus*
Trithemis imitata	*Trithemis tropicana*	*Urothemis assignata*	*Zyxomma atlanticum*
Trithemis integra	*Trithetrum congoense*	*Urothemis edwardsii*	
Trithemis kirbyi	*Trithetrum navasi*	*Zygonoides occidentis*	
Trithemis nuptialis	*Umma cincta*	*Zygonyx eusebia*	

AT0725: Zambezian and Mopane Woodlands (174 species, 8 616 records)

Species	Species	Species	Species
Aciagrion dondoense	*Brachythemis lacustris*	*Hadrothemis scabrifrons*	*Orthetrum brachiale*
Aciagrion gracile	*Brachythemis leucosticta*	*Hemistigma albipunctum*	*Orthetrum caffrum*
Aciagrion heterostictum	*Brachythemis wilsoni*	*Ictinogomphus dundoensis*	*Orthetrum chrysostigma*
Aciagrion steeleae	*Bradinopyga cornuta*	*Ictinogomphus ferox*	*Orthetrum guineense*
Acisoma variegatum	*Ceratogomphus pictus*	*Ischnura senegalensis*	*Orthetrum hintzi*
Aethiothemis bequaerti	*Ceriagrion corallinum*	*Lestes amicus*	*Orthetrum icteromelas*
Aethiothemis solitaria	*Ceriagrion glabrum*	*Lestes dissimulans*	*Orthetrum julia*
Aethriamanta rezia	*Ceriagrion katamborae*	*Lestes ictericus*	*Orthetrum machadoi*
Africallagma fractum	*Ceriagrion suave*	*Lestes ochraceus*	*Orthetrum robustum*
Africallagma glaucum	*Chalcostephia flavifrons*	*Lestes pallidus*	*Orthetrum stemmale*
Africallagma sinuatum	*Chlorocypha consueta*	*Lestes pinheyi*	*Orthetrum trinacria*
Africallagma subtile	*Chlorolestes fasciatus*	*Lestes plagiatus*	*Palpopleura deceptor*
Agriocnemis exilis	*Chlorolestes tessellatus*	*Lestes tridens*	*Palpopleura jucunda*
Agriocnemis falcifera	*Crenigomphus cornutus*	*Lestes uncifer*	*Palpopleura lucia*
Agriocnemis gratiosa	*Crenigomphus hartmanni*	*Lestes virgatus*	*Palpopleura portia*
Agriocnemis pinheyi	*Crocothemis divisa*	*Lestinogomphus angustus*	*Pantala flavescens*
Agriocnemis ruberrima	*Crocothemis erythraea*	*Lestinogomphus silkeae*	*Paragomphus cataractae*
Agriocnemis victoria	*Crocothemis sanguinolenta*	*Mesocnemis singularis*	*Paragomphus cognatus*
Allocnemis leucosticta	*Crocothemis saxicolor*	*Microgomphus nyassicus*	*Paragomphus elpidius*
Allocnemis marshalli	*Diplacodes deminuta*	*Nesciothemis farinosa*	*Paragomphus genei*
Anaciaeschna triangulifera	*Diplacodes lefebvrii*	*Nesciothemis fitzgeraldi*	*Paragomphus magnus*
Anax bangweuluensis	*Diplacodes luminans*	*Neurogomphus cocytius*	*Paragomphus nyasicus*
Anax chloromelas	*Diplacodes pumila*	*Neurogomphus zambeziensis*	*Paragomphus sabicus*
Anax ephippiger	*Elattoneura cellularis*	*Notiothemis jonesi*	*Paragomphus zambeziensis*
Anax imperator	*Elattoneura glauca*	*Notogomphus praetorius*	*Parazyxomma flavicans*
Anax speratus	*Eleuthemis quadrigutta*	*Notogomphus zernyi*	*Phaon iridipennis*
Anax tristis	*Gomphidia quarrei*	*Olpogastra lugubris*	*Phyllogomphus selysi*
Atoconeura biordinata	*Gynacantha manderica*	*Onychogomphus supinus*	*Phyllomacromia contumax*
Azuragrion nigridorsum	*Gynacantha villosa*	*Orthetrum abbotti*	*Phyllomacromia monoceros*

AT0725: Zambezian and Mopane Woodlands (*continued*)

Species	Species	Species	Species
Phyllomacromia picta	*Pseudagrion hageni*	*Rhyothemis semihyalina*	*Trithemis monardi*
Pinheyagrion angolicum	*Pseudagrion hamoni*	*Sympetrum fonscolombii*	*Trithemis palustris*
Pinheyschna rileyi	*Pseudagrion helenae*	*Tetrathemis polleni*	*Trithemis pluvialis*
Pinheyschna subpupillata	*Pseudagrion inopinatum*	*Tholymis tillarga*	*Trithemis stictica*
Platycypha caligata	*Pseudagrion kersteni*	*Tramea basilaris*	*Trithemis werneri*
Proischnura rotundipennis	*Pseudagrion makabusiense*	*Tramea limbata*	*Trithetrum navasi*
Proischnura subfurcata	*Pseudagrion massaicum*	*Trithemis aconita*	*Urothemis assignata*
Pseudagrion acaciae	*Pseudagrion nubicum*	*Trithemis aequalis*	*Urothemis edwardsii*
Pseudagrion assegaii	*Pseudagrion rufostigma*	*Trithemis annulata*	*Zosteraeschna minuscula*
Pseudagrion caffrum	*Pseudagrion salisburyense*	*Trithemis arteriosa*	*Zosteraeschna usambarica*
Pseudagrion coeleste	*Pseudagrion sjoestedti*	*Trithemis donaldsoni*	*Zygonoides fuelleborni*
Pseudagrion commoniae	*Pseudagrion spernatum*	*Trithemis dorsalis*	*Zygonyx natalensis*
Pseudagrion deningi	*Pseudagrion sublacteum*	*Trithemis furva*	*Zygonyx torridus*
Pseudagrion gamblesi	*Pseudagrion sudanicum*	*Trithemis hecate*	
Pseudagrion glaucescens	*Rhyothemis fenestrina*	*Trithemis kirbyi*	

AT0726: Zambezian Baikiaea Woodlands (115 species, 2 385 records)

Species	Species	Species	Species
Aciagrion heterostictum	*Ceriagrion glabrum*	*Lestes plagiatus*	*Pantala flavescens*
Aethiothemis solitaria	*Ceriagrion katamborae*	*Lestes tridens*	*Paragomphus cataractae*
Aethriamanta rezia	*Ceriagrion suave*	*Lestinogomphus angustus*	*Paragomphus cognatus*
Africallagma subtile	*Chalcostephia flavifrons*	*Lestinogomphus silkeae*	*Paragomphus elpidius*
Agriocnemis angolensis	*Crenigomphus cornutus*	*Mesocnemis singularis*	*Paragomphus genei*
Agriocnemis bumhilli	*Crenigomphus kavangoensis*	*Nesciothemis farinosa*	*Paragomphus sabicus*
Agriocnemis exilis	*Crocothemis divisa*	*Neurogomphus cocytius*	*Parazyxomma flavicans*
Agriocnemis gratiosa	*Crocothemis erythraea*	*Neurogomphus zambeziensis*	*Phaon iridipennis*
Agriocnemis ruberrima	*Crocothemis sanguinolenta*	*Olpogastra lugubris*	*Phyllogomphus selysi*
Agriocnemis victoria	*Diplacodes deminuta*	*Orthetrum brachiale*	*Phyllomacromia contumax*
Allocnemis marshalli	*Diplacodes lefebvrii*	*Orthetrum caffrum*	*Phyllomacromia picta*
Anax bangweuluensis	*Diplacodes luminans*	*Orthetrum chrysostigma*	*Platycypha caligata*
Anax ephippiger	*Elattoneura glauca*	*Orthetrum icteromelas*	*Pseudagrion acaciae*
Anax imperator	*Gomphidia quarrei*	*Orthetrum julia*	*Pseudagrion assegaii*
Anax tristis	*Gynacantha manderica*	*Orthetrum machadoi*	*Pseudagrion coeleste*
Azuragrion nigridorsum	*Hemistigma albipunctum*	*Orthetrum robustum*	*Pseudagrion commoniae*
Brachythemis lacustris	*Ictinogomphus dundoensis*	*Orthetrum stemmale*	*Pseudagrion deningi*
Brachythemis leucosticta	*Ictinogomphus ferox*	*Orthetrum trinacria*	*Pseudagrion glaucescens*
Brachythemis wilsoni	*Ischnura senegalensis*	*Palpopleura deceptor*	*Pseudagrion hamoni*
Bradinopyga cornuta	*Lestes dissimulans*	*Palpopleura jucunda*	*Pseudagrion kersteni*
Ceratogomphus pictus	*Lestes pallidus*	*Palpopleura lucia*	*Pseudagrion massaicum*
Ceriagrion corallinum	*Lestes pinheyi*	*Palpopleura portia*	*Pseudagrion rufostigma*

AT0726: Zambezian Baikiaea Woodlands (*continued*)

Species	Species	Species	Species
Pseudagrion salisburyense	*Tholymis tillarga*	*Trithemis donaldsoni*	*Trithetrum navasi*
Pseudagrion sjoestedti	*Tramea basilaris*	*Trithemis furva*	*Urothemis assignata*
Pseudagrion sublacteum	*Tramea limbata*	*Trithemis hecate*	*Urothemis edwardsii*
Pseudagrion sudanicum	*Trithemis aconita*	*Trithemis kirbyi*	*Zygonoides fuelleborni*
Rhyothemis fenestrina	*Trithemis aequalis*	*Trithemis monardi*	*Zygonyx natalensis*
Rhyothemis semihyalina	*Trithemis annulata*	*Trithemis palustris*	*Zygonyx torridus*
Sympetrum fonscolombii	*Trithemis arteriosa*	*Trithemis stictica*	

AT0902: Etosha Pan Halophytics (23 species, 109 records)

Species	Species	Species	Species
Agriocnemis exilis	*Crocothemis sanguinolenta*	*Orthetrum trinacria*	*Tramea basilaris*
Anax ephippiger	*Diplacodes lefebvrii*	*Pantala flavescens*	*Trithemis annulata*
Anax imperator	*Diplacodes luminans*	*Pseudagrion kersteni*	*Trithemis arteriosa*
Anax tristis	*Ischnura senegalensis*	*Pseudagrion massaicum*	*Trithemis hecate*
Ceriagrion glabrum	*Lestes pallidus*	*Sympetrum fonscolombii*	*Trithemis kirbyi*
Crocothemis erythraea	*Orthetrum chrysostigma*	*Tholymis tillarga*	

AT0903: Inner Niger Delta Flooded Savanna (12 species, 48 records)

Species	Species	Species	Species
Agriocnemis zerafica	*Diplacodes lefebvrii*	*Orthetrum trinacria*	*Trithemis annulata*
Brachythemis leucosticta	*Ischnura senegalensis*	*Pantala flavescens*	*Trithemis hecate*
Crocothemis erythraea	*Orthetrum chrysostigma*	*Pseudagrion torridum*	*Urothemis edwardsii*

AT0904: Lake Chad Flooded Savanna (6 species, 12 records)

Species	Species	Species
Brachythemis impartita	*Crocothemis erythraea*	*Hemistigma albipunctum*
Brachythemis leucosticta	*Diplacodes lefebvrii*	*Urothemis edwardsii*

AT0905: Saharan Flooded Grasslands (38 species, 94 records)

Species	Species	Species	Species
Aethiothemis solitaria	*Agriocnemis inversa*	*Brachythemis leucosticta*	*Crocothemis erythraea*
Agriocnemis exilis	*Agriocnemis zerafica*	*Ceriagrion glabrum*	*Diplacodes lefebvrii*
Agriocnemis forcipata	*Anax ephippiger*	*Ceriagrion suave*	*Hemistigma albipunctum*
Agriocnemis gratiosa	*Brachythemis lacustris*	*Crocothemis divisa*	*Ischnura senegalensis*

AT0905: Saharan Flooded Grasslands (*continued*)

Species	Species	Species	Species
Lestes ictericus	*Orthetrum chrysostigma*	*Pseudagrion sudanicum*	*Trithemis hecate*
Lestes ochraceus	*Orthetrum icteromelas*	*Pseudagrion torridum*	*Trithemis werneri*
Mesocnemis singularis	*Pantala flavescens*	*Rhyothemis semihyalina*	*Urothemis assignata*
Nesciothemis farinosa	*Pseudagrion niloticum*	*Tholymis tillarga*	*Urothemis edwardsii*
Orthetrum angustiventre	*Pseudagrion nubicum*	*Trithemis annulata*	
Orthetrum brachiale	*Pseudagrion sjoestedti*	*Trithemis arteriosa*	

AT0906: Zambezian Coastal Flooded Savanna (57 species, 217 records)

Species	Species	Species	Species
Aciagrion dondoense	*Crocothemis erythraea*	*Orthetrum caffrum*	*Pseudagrion lindicum*
Aciagrion gracile	*Diplacodes lefebvrii*	*Orthetrum chrysostigma*	*Pseudagrion massaicum*
Acisoma variegatum	*Diplacodes luminans*	*Orthetrum icteromelas*	*Rhyothemis semihyalina*
Aethriamanta rezia	*Elattoneura glauca*	*Orthetrum julia*	*Tetrathemis polleni*
Agriocnemis exilis	*Gynacantha usambarica*	*Orthetrum stemmale*	*Tholymis tillarga*
Agriocnemis gratiosa	*Hadrothemis scabrifrons*	*Orthetrum trinacria*	*Trithemis annulata*
Anax chloromelas	*Hemistigma albipunctum*	*Palpopleura lucia*	*Trithemis arteriosa*
Anax ephippiger	*Ictinogomphus ferox*	*Palpopleura portia*	*Trithemis furva*
Anax imperator	*Ischnura senegalensis*	*Paragomphus genei*	*Trithemis monardi*
Azuragrion nigridorsum	*Lestes ictericus*	*Pseudagrion acaciae*	*Urothemis assignata*
Brachythemis lacustris	*Lestes plagiatus*	*Pseudagrion coeleste*	*Urothemis edwardsii*
Brachythemis leucosticta	*Lestes uncifer*	*Pseudagrion commoniae*	*Urothemis luciana*
Ceriagrion glabrum	*Neurogomphus zambeziensis*	*Pseudagrion glaucescens*	
Ceriagrion suave	*Olpogastra lugubris*	*Pseudagrion hamoni*	
Chalcostephia flavifrons	*Orthetrum brachiale*	*Pseudagrion helenae*	

AT0907: Zambezian Flooded Grasslands (139 species, 4 594 records)

Species	Species	Species	Species
Aciagrion heterostictum	*Agriocnemis victoria*	*Bradinopyga cornuta*	*Crocothemis erythraea*
Aciagrion steeleae	*Allocnemis marshalli*	*Ceriagrion corallinum*	*Crocothemis sanguinolenta*
Acisoma inflatum	*Anaciaeschna triangulifera*	*Ceriagrion glabrum*	*Crocothemis saxicolor*
Aethiothemis solitaria	*Anax bangweuluensis*	*Ceriagrion katamborae*	*Diastatomma soror*
Aethriamanta rezia	*Anax ephippiger*	*Ceriagrion suave*	*Diplacodes deminuta*
Africallagma glaucum	*Anax imperator*	*Ceriagrion whellani*	*Diplacodes lefebvrii*
Africallagma subtile	*Anax speratus*	*Chalcostephia flavifrons*	*Diplacodes luminans*
Agriocnemis angolensis	*Anax tristis*	*Crenigomphus cornutus*	*Diplacodes pumila*
Agriocnemis exilis	*Brachythemis lacustris*	*Crenigomphus hartmanni*	*Elattoneura cellularis*
Agriocnemis gratiosa	*Brachythemis leucosticta*	*Crenigomphus kavangoensis*	*Elattoneura glauca*
Agriocnemis ruberrima	*Brachythemis wilsoni*	*Crocothemis divisa*	*Gomphidia quarrei*

AT0907: Zambezian Flooded Grasslands (*continued*)

Species	Species	Species	Species
Gynacantha manderica	*Orthetrum caffrum*	*Pinheyagrion angolicum*	*Thermochoria jeanneli*
Gynacantha villosa	*Orthetrum chrysostigma*	*Pinheyschna rileyi*	*Tholymis tillarga*
Hemistigma albipunctum	*Orthetrum hintzi*	*Platycypha caligata*	*Tramea basilaris*
Ictinogomphus dundoensis	*Orthetrum icteromelas*	*Pseudagrion acaciae*	*Trithemis aconita*
Ictinogomphus ferox	*Orthetrum julia*	*Pseudagrion assegaii*	*Trithemis aequalis*
Ischnura senegalensis	*Orthetrum machadoi*	*Pseudagrion coeleste*	*Trithemis annulata*
Lestes amicus	*Orthetrum monardi*	*Pseudagrion commoniae*	*Trithemis arteriosa*
Lestes dissimulans	*Orthetrum robustum*	*Pseudagrion deningi*	*Trithemis donaldsoni*
Lestes ochraceus	*Orthetrum stemmale*	*Pseudagrion fisheri*	*Trithemis grouti*
Lestes pallidus	*Orthetrum trinacria*	*Pseudagrion glaucescens*	*Trithemis hecate*
Lestes pinheyi	*Palpopleura deceptor*	*Pseudagrion hamoni*	*Trithemis kirbyi*
Lestes plagiatus	*Palpopleura jucunda*	*Pseudagrion helenae*	*Trithemis monardi*
Lestes tridens	*Palpopleura lucia*	*Pseudagrion kersteni*	*Trithemis nuptialis*
Lestes virgatus	*Palpopleura portia*	*Pseudagrion makabusiense*	*Trithemis palustris*
Lestinogomphus angustus	*Pantala flavescens*	*Pseudagrion massaicum*	*Trithemis pluvialis*
Lestinogomphus silkeae	*Paragomphus cataractae*	*Pseudagrion nubicum*	*Trithemis pruinata*
Mesocnemis singularis	*Paragomphus elpidius*	*Pseudagrion rufostigma*	*Trithemis stictica*
Nesciothemis farinosa	*Paragomphus genei*	*Pseudagrion sjoestedti*	*Trithetrum navasi*
Neurogomphus cocytius	*Paragomphus sabicus*	*Pseudagrion sublacteum*	*Urothemis assignata*
Neurogomphus zambeziensis	*Parazyxomma flavicans*	*Pseudagrion sudanicum*	*Urothemis edwardsii*
Notogomphus praetorius	*Phaon iridipennis*	*Rhyothemis fenestrina*	*Zygonoides fuelleborni*
Olpogastra lugubris	*Phyllogomphus selysi*	*Rhyothemis mariposa*	*Zygonyx natalensis*
Orthetrum abbotti	*Phyllomacromia contumax*	*Rhyothemis semihyalina*	*Zygonyx torridus*
Orthetrum brachiale	*Phyllomacromia picta*	*Sympetrum fonscolombii*	

AT0908: Zambezian Halophytics (23 species, 68 records)

Species	Species	Species	Species
Anax ephippiger	*Diplacodes luminans*	*Orthetrum trinacria*	*Tholymis tillarga*
Anax imperator	*Ischnura senegalensis*	*Pantala flavescens*	*Tramea basilaris*
Brachythemis leucosticta	*Lestes pallidus*	*Pseudagrion massaicum*	*Trithemis annulata*
Crocothemis erythraea	*Olpogastra lugubris*	*Pseudagrion nubicum*	*Trithemis arteriosa*
Crocothemis sanguinolenta	*Orthetrum brachiale*	*Rhyothemis semihyalina*	*Urothemis edwardsii*
Diplacodes lefebvrii	*Orthetrum robustum*	*Sympetrum fonscolombii*	

AT1001: Angolan Montane Forest-Grassland Mosaic (34 species, 94 records)

Species	Species	Species	Species
Aethiothemis bequaerti	*Anax speratus*	*Ceriagrion glabrum*	*Crocothemis brevistigma*
Anax ephippiger	*Brachythemis leucosticta*	*Chlorocypha crocea*	*Crocothemis sanguinolenta*

AT1001: Angolan Montane Forest-Grassland Mosaic (*continued*)

Species	Species	Species	Species
Ischnura senegalensis	*Orthetrum macrostigma*	*Pseudagrion inconspicuum*	*Trithemis kirbyi*
Orthetrum abbotti	*Palpopleura jucunda*	*Pseudagrion kersteni*	*Trithemis palustris*
Orthetrum brachiale	*Palpopleura portia*	*Pseudagrion melanicterum*	*Trithemis pluvialis*
Orthetrum caffrum	*Platycypha caligata*	*Pseudagrion salisburyense*	*Trithemis stictica*
Orthetrum guineense	*Porpax risi*	*Tramea basilaris*	*Umma electa*
Orthetrum hintzi	*Pseudagrion angolense*	*Trithemis dorsalis*	
Orthetrum julia	*Pseudagrion estesi*	*Trithemis furva*	

AT1002: Angolan Scarp Savanna and Woodlands (29 species, 52 records)

Species	Species	Species	Species
Aethriamanta rezia	*Elattoneura glauca*	*Pantala flavescens*	*Trithemis annulata*
Agriocnemis exilis	*Hemistigma albipunctum*	*Phaon iridipennis*	*Trithemis arteriosa*
Anax imperator	*Ischnura senegalensis*	*Platycypha angolensis*	*Trithemis kirbyi*
Brachythemis leucosticta	*Orthetrum brachiale*	*Platycypha rufitibia*	*Urothemis assignata*
Ceriagrion glabrum	*Orthetrum chrysostigma*	*Pseudagrion angolense*	*Urothemis edwardsii*
Crocothemis erythraea	*Orthetrum trinacria*	*Pseudagrion glaucescens*	
Diplacodes lefebvrii	*Palpopleura deceptor*	*Pseudagrion massaicum*	
Diplacodes luminans	*Palpopleura portia*	*Tholymis tillarga*	

AT1003: Drakensberg Alti-Montane Grasslands and Woodlands (27 species, 124 records)

Species	Species	Species	Species
Africallagma glaucum	*Diplacodes lefebvrii*	*Paragomphus cognatus*	*Pseudagrion spernatum*
Africallagma sapphirinum	*Lestes plagiatus*	*Pinheyschna subpupillata*	*Sympetrum fonscolombii*
Allocnemis leucosticta	*Notogomphus praetorius*	*Proischnura rotundipennis*	*Trithemis dorsalis*
Anax imperator	*Orthetrum abbotti*	*Pseudagrion caffrum*	*Trithemis furva*
Chlorolestes draconicus	*Orthetrum caffrum*	*Pseudagrion citricola*	*Trithemis stictica*
Chlorolestes fasciatus	*Orthetrum julia*	*Pseudagrion draconis*	*Zosteraeschna minuscula*
Crocothemis sanguinolenta	*Pantala flavescens*	*Pseudagrion salisburyense*	

AT1004: Drakensberg Montane Grasslands, Woodlands and Forests (121 species, 6 284 records)

Species	Species	Species	Species
Acisoma inflatum	*Africallagma sapphirinum*	*Agriocnemis gratiosa*	*Anax ephippiger*
Acisoma variegatum	*Africallagma sinuatum*	*Agriocnemis pinheyi*	*Anax imperator*
Africallagma fractum	*Agriocnemis exilis*	*Allocnemis leucosticta*	*Anax speratus*
Africallagma glaucum	*Agriocnemis falcifera*	*Anaciaeschna triangulifera*	*Anax tristis*

AT1004: Drakensberg Montane Grasslands, Woodlands and Forests (*continued*)

Species	Species	Species	Species
Azuragrion nigridorsum	*Mesocnemis singularis*	*Phaon iridipennis*	*Sympetrum fonscolombii*
Brachythemis lacustris	*Metacnemis valida*	*Phyllogomphus selysi*	*Syncordulia gracilis*
Brachythemis leucosticta	*Nesciothemis farinosa*	*Phyllomacromia contumax*	*Tetrathemis polleni*
Bradinopyga cornuta	*Neurogomphus zambeziensis*	*Phyllomacromia picta*	*Tholymis tillarga*
Ceratogomphus pictus	*Notiothemis jonesi*	*Pinheyschna subpupillata*	*Tramea basilaris*
Ceriagrion glabrum	*Notogomphus praetorius*	*Platycypha caligata*	*Tramea limbata*
Chalcostephia flavifrons	*Olpogastra lugubris*	*Platycypha fitzsimonsi*	*Trithemis aconita*
Chlorolestes apricans	*Onychogomphus supinus*	*Proischnura rotundipennis*	*Trithemis annulata*
Chlorolestes draconicus	*Orthetrum abbotti*	*Pseudagrion acaciae*	*Trithemis arteriosa*
Chlorolestes elegans	*Orthetrum caffrum*	*Pseudagrion assegaii*	*Trithemis donaldsoni*
Chlorolestes fasciatus	*Orthetrum chrysostigma*	*Pseudagrion caffrum*	*Trithemis dorsalis*
Chlorolestes tessellatus	*Orthetrum guineense*	*Pseudagrion citricola*	*Trithemis furva*
Crenigomphus hartmanni	*Orthetrum hintzi*	*Pseudagrion commoniae*	*Trithemis hecate*
Crocothemis erythraea	*Orthetrum icteromelas*	*Pseudagrion draconis*	*Trithemis kirbyi*
Crocothemis sanguinolenta	*Orthetrum julia*	*Pseudagrion gamblesi*	*Trithemis pluvialis*
Diplacodes lefebvrii	*Orthetrum machadoi*	*Pseudagrion hageni*	*Trithemis stictica*
Diplacodes luminans	*Orthetrum stemmale*	*Pseudagrion hamoni*	*Trithemis werneri*
Diplacodes pumila	*Orthetrum trinacria*	*Pseudagrion inopinatum*	*Urothemis assignata*
Elattoneura glauca	*Palpopleura deceptor*	*Pseudagrion kersteni*	*Urothemis edwardsii*
Hemistigma albipunctum	*Palpopleura jucunda*	*Pseudagrion makabusiense*	*Zosteraeschna minuscula*
Ictinogomphus ferox	*Palpopleura lucia*	*Pseudagrion massaicum*	*Zosteraeschna usambarica*
Ischnura senegalensis	*Palpopleura portia*	*Pseudagrion newtoni*	*Zygonoides fuelleborni*
Lestes pallidus	*Pantala flavescens*	*Pseudagrion salisburyense*	*Zygonyx natalensis*
Lestes plagiatus	*Paragomphus cognatus*	*Pseudagrion spernatum*	*Zygonyx torridus*
Lestes uncifer	*Paragomphus elpidius*	*Pseudagrion sublacteum*	
Lestes virgatus	*Paragomphus genei*	*Pseudagrion sudanicum*	
Lestinogomphus angustus	*Parazyxomma flavicans*	*Rhyothemis semihyalina*	

AT1005: East African Montane Moorlands (13 species, 18 records)

Species	Species	Species	Species
Anax speratus	*Orthetrum julia*	*Proischnura subfurcata*	*Zygonyx torridus*
Atoconeura kenya	*Palpopleura lucia*	*Pseudagrion bicoerulans*	
Notogomphus kilimandjaricus	*Palpopleura portia*	*Pseudagrion kersteni*	
Orthetrum camerunense	*Pinheyschna meruensis*	*Zosteraeschna ellioti*	

AT1006: Eastern Zimbabwe Montane Forest-Grassland Mosaic (107 species, 809 records)

Species	Species	Species	Species
Aciagrion gracile	*Acisoma variegatum*	*Africallagma fractum*	*Africallagma subtile*
Acisoma inflatum	*Africallagma cuneistigma*	*Africallagma glaucum*	*Agriocnemis exilis*

AT1006: Eastern Zimbabwe Montane Forest-Grassland Mosaic (*continued*)

Species	Species	Species	Species
Agriocnemis pinheyi	*Elattoneura glauca*	*Orthetrum hintzi*	*Pseudagrion kersteni*
Allocnemis marshalli	*Eleuthemis quadrigutta*	*Orthetrum julia*	*Pseudagrion makabusiense*
Anax ephippiger	*Gomphidia quarrei*	*Orthetrum machadoi*	*Pseudagrion salisburyense*
Anax imperator	*Hadrothemis scabrifrons*	*Orthetrum trinacria*	*Pseudagrion sjoestedti*
Anax speratus	*Hemistigma albipunctum*	*Palpopleura jucunda*	*Pseudagrion spernatum*
Anax tristis	*Ictinogomphus ferox*	*Palpopleura lucia*	*Pseudagrion sublacteum*
Atoconeura biordinata	*Ischnura senegalensis*	*Palpopleura portia*	*Pseudagrion vumbaense*
Azuragrion nigridorsum	*Lestes amicus*	*Pantala flavescens*	*Rhyothemis semihyalina*
Brachythemis lacustris	*Lestes plagiatus*	*Paragomphus cognatus*	*Tetrathemis polleni*
Brachythemis leucosticta	*Lestes tridens*	*Paragomphus elpidius*	*Tramea basilaris*
Bradinopyga cornuta	*Lestes uncifer*	*Paragomphus genei*	*Tramea limbata*
Ceratogomphus pictus	*Lestes virgatus*	*Paragomphus sabicus*	*Trithemis annulata*
Ceriagrion glabrum	*Lestinogomphus angustus*	*Phaon iridipennis*	*Trithemis arteriosa*
Ceriagrion suave	*Mesocnemis singularis*	*Phyllomacromia monoceros*	*Trithemis donaldsoni*
Ceriagrion whellani	*Microgomphus nyassicus*	*Phyllomacromia picta*	*Trithemis dorsalis*
Chlorocypha consueta	*Nesciothemis farinosa*	*Pinheyschna rileyi*	*Trithemis furva*
Chlorolestes elegans	*Notiothemis jonesi*	*Platycypha caligata*	*Trithemis kirbyi*
Crenigomphus hartmanni	*Notogomphus dendrohyrax*	*Platycypha fitzsimonsi*	*Trithemis pluvialis*
Crocothemis divisa	*Notogomphus praetorius*	*Platycypha inyangae*	*Trithemis stictica*
Crocothemis erythraea	*Notogomphus zernyi*	*Porpax risi*	*Urothemis assignata*
Crocothemis sanguinolenta	*Onychogomphus supinus*	*Proischnura subfurcata*	*Zosteraeschna usambarica*
Crocothemis saxicolor	*Orthetrum abbotti*	*Pseudagrion commoniae*	*Zygonoides fuelleborni*
Diplacodes lefebvrii	*Orthetrum caffrum*	*Pseudagrion gamblesi*	*Zygonyx natalensis*
Diplacodes luminans	*Orthetrum chrysostigma*	*Pseudagrion hageni*	*Zygonyx torridus*
Diplacodes pumila	*Orthetrum guineense*	*Pseudagrion hamoni*	

AT1007: Ethiopian Montane Grasslands and Woodlands (70 species, 443 records)

Species	Species	Species	Species
Africallagma elongatum	*Ceriagrion glabrum*	*Nesciothemis farinosa*	*Orthetrum kristenseni*
Agriocnemis exilis	*Crocothemis erythraea*	*Notogomphus cottarellii*	*Orthetrum machadoi*
Agriocnemis inversa	*Crocothemis sanguinolenta*	*Notogomphus dorsalis*	*Orthetrum monardi*
Anaciaeschna triangulifera	*Diplacodes lefebvrii*	*Notogomphus lecythus*	*Orthetrum stemmale*
Anax ephippiger	*Elattoneura pasquinii*	*Notogomphus ruppeli*	*Orthetrum trinacria*
Anax imperator	*Gynacantha nigeriensis*	*Orthetrum abbotti*	*Palpopleura jucunda*
Anax speratus	*Gynacantha villosa*	*Orthetrum brachiale*	*Palpopleura lucia*
Atoconeura aethiopica	*Ictinogomphus ferox*	*Orthetrum caffrum*	*Palpopleura portia*
Azuragrion vansomereni	*Ischnura abyssinica*	*Orthetrum chrysostigma*	*Pantala flavescens*
Brachythemis impartita	*Ischnura senegalensis*	*Orthetrum guineense*	*Paragomphus crenigomphoides*
Brachythemis lacustris	*Lestes tridens*	*Orthetrum hintzi*	*Pinheyschna waterstoni*
Brachythemis leucosticta	*Lestes virgatus*	*Orthetrum julia*	*Platycypha caligata*

AT1007: Ethiopian Montane Grasslands and Woodlands (*continued*)

Species	Species	Species	Species
Proischnura subfurcata	*Pseudagrion kersteni*	*Sympetrum fonscolombii*	*Trithemis imitata*
Pseudagrion commoniae	*Pseudagrion massaicum*	*Tramea limbata*	*Trithemis kirbyi*
Pseudagrion gamblesi	*Pseudagrion nubicum*	*Trithemis annulata*	*Trithemis stictica*
Pseudagrion guichardi	*Pseudagrion salisburyense*	*Trithemis arteriosa*	*Zosteraeschna ellioti*
Pseudagrion hamoni	*Pseudagrion spernatum*	*Trithemis ellenbeckii*	
Pseudagrion kaffinum	*Pseudagrion sublacteum*	*Trithemis furva*	

AT1008: Ethiopian Montane Moorlands (8 species, 18 records)

Species	Species	Species	Species
Ischnura abyssinica	*Orthetrum caffrum*	*Orthetrum kristenseni*	*Pseudagrion guichardi*
Notogomphus ruppeli	*Orthetrum chrysostigma*	*Platycypha caligata*	*Pseudagrion spernatum*

AT1009: Highveld Grasslands (85 species, 2 744 records)

Species	Species	Species	Species
Africallagma glaucum	*Ictinogomphus ferox*	*Palpopleura portia*	*Pseudagrion sublacteum*
Africallagma sapphirinum	*Ischnura senegalensis*	*Pantala flavescens*	*Pseudagrion vaalense*
Agriocnemis falcifera	*Lestes pallidus*	*Paragomphus cognatus*	*Rhyothemis semihyalina*
Agriocnemis pinheyi	*Lestes plagiatus*	*Paragomphus genei*	*Sympetrum fonscolombii*
Allocnemis leucosticta	*Lestes virgatus*	*Phaon iridipennis*	*Tholymis tillarga*
Anax ephippiger	*Lestinogomphus angustus*	*Phyllomacromia contumax*	*Tramea basilaris*
Anax imperator	*Mesocnemis singularis*	*Phyllomacromia picta*	*Tramea limbata*
Anax speratus	*Nesciothemis farinosa*	*Pinheyschna subpupillata*	*Trithemis annulata*
Anax tristis	*Notogomphus praetorius*	*Platycypha caligata*	*Trithemis arteriosa*
Azuragrion nigridorsum	*Onychogomphus supinus*	*Platycypha fitzsimonsi*	*Trithemis donaldsoni*
Brachythemis leucosticta	*Orthetrum abbotti*	*Proischnura rotundipennis*	*Trithemis dorsalis*
Bradinopyga cornuta	*Orthetrum caffrum*	*Pseudagrion assegaii*	*Trithemis furva*
Ceratogomphus pictus	*Orthetrum chrysostigma*	*Pseudagrion caffrum*	*Trithemis kirbyi*
Ceriagrion glabrum	*Orthetrum guineense*	*Pseudagrion citricola*	*Trithemis pluvialis*
Chlorolestes fasciatus	*Orthetrum hintzi*	*Pseudagrion coeleste*	*Trithemis stictica*
Chlorolestes tessellatus	*Orthetrum icteromelas*	*Pseudagrion draconis*	*Urothemis assignata*
Crenigomphus hartmanni	*Orthetrum julia*	*Pseudagrion gamblesi*	*Zosteraeschna minuscula*
Crocothemis erythraea	*Orthetrum machadoi*	*Pseudagrion hageni*	*Zygonyx natalensis*
Crocothemis sanguinolenta	*Orthetrum trinacria*	*Pseudagrion kersteni*	*Zygonyx torridus*
Diplacodes lefebvrii	*Palpopleura deceptor*	*Pseudagrion massaicum*	
Diplacodes luminans	*Palpopleura jucunda*	*Pseudagrion salisburyense*	
Elattoneura glauca	*Palpopleura lucia*	*Pseudagrion spernatum*	

AT1010: Jos Plateau Forest-Grasslands Mosaic (89 species, 264 records)

Species	Species	Species	Species
Aciagrion africanum	*Crocothemis erythraea*	*Orthetrum abbotti*	*Pseudagrion melanicterum*
Acisoma inflatum	*Crocothemis sanguinolenta*	*Orthetrum austeni*	*Pseudagrion sublacteum*
Aethiothemis bequaerti	*Diplacodes deminuta*	*Orthetrum brachiale*	*Pseudagrion sudanicum*
Aethiothemis solitaria	*Diplacodes lefebvrii*	*Orthetrum chrysostigma*	*Tetrathemis polleni*
Africallagma subtile	*Diplacodes luminans*	*Orthetrum guineense*	*Tramea basilaris*
Agriocnemis exilis	*Elattoneura nigra*	*Orthetrum hintzi*	*Tramea limbata*
Agriocnemis victoria	*Gynacantha cylindrata*	*Orthetrum icteromelas*	*Trithemis aconita*
Anax ephippiger	*Gynacantha manderica*	*Orthetrum monardi*	*Trithemis arteriosa*
Anax imperator	*Gynacantha nigeriensis*	*Orthetrum trinacria*	*Trithemis bredoi*
Anax rutherfordi	*Gynacantha vesiculata*	*Oxythemis phoenicosceles*	*Trithemis dichroa*
Anax tristis	*Gynacantha villosa*	*Palpopleura deceptor*	*Trithemis furva*
Azuragrion vansomereni	*Hemistigma albipunctum*	*Palpopleura jucunda*	*Trithemis imitata*
Brachythemis impartita	*Ischnura senegalensis*	*Palpopleura portia*	*Trithemis kalula*
Brachythemis wilsoni	*Lestes dissimulans*	*Pantala flavescens*	*Trithemis kirbyi*
Bradinopyga strachani	*Lestes pallidus*	*Paragomphus genei*	*Trithemis pruinata*
Ceriagrion bakeri	*Lestes pinheyi*	*Paragomphus serrulatus*	*Trithemis stictica*
Ceriagrion glabrum	*Lestes plagiatus*	*Phaon iridipennis*	*Urothemis assignata*
Ceriagrion rubellocerinum	*Lestes tridens*	*Phyllomacromia contumax*	*Urothemis edwardsii*
Ceriagrion suave	*Lestes virgatus*	*Phyllomacromia picta*	*Zygonyx natalensis*
Chalcostephia flavifrons	*Neodythemis klingi*	*Proischnura subfurcata*	*Zygonyx torridus*
Chlorocypha curta	*Nesciothemis minor*	*Pseudagrion emarginatum*	
Copera sikassoensis	*Nesciothemis pujoli*	*Pseudagrion glaucescens*	
Crocothemis divisa	*Olpogastra lugubris*	*Pseudagrion kersteni*	

AT1012: Maputaland-Pondoland Bushland and Thickets (93 species, 881 records)

Species	Species	Species	Species
Acisoma variegatum	*Azuragrion nigridorsum*	*Hemistigma albipunctum*	*Orthetrum caffrum*
Aethriamanta rezia	*Brachythemis leucosticta*	*Ictinogomphus ferox*	*Orthetrum chrysostigma*
Africallagma fractum	*Ceratogomphus pictus*	*Ischnura senegalensis*	*Orthetrum hintzi*
Africallagma glaucum	*Ceriagrion glabrum*	*Lestes pallidus*	*Orthetrum icteromelas*
Africallagma sapphirinum	*Chalcostephia flavifrons*	*Lestes plagiatus*	*Orthetrum julia*
Agriocnemis falcifera	*Chlorolestes fasciatus*	*Lestes tridens*	*Orthetrum machadoi*
Agriocnemis gratiosa	*Chlorolestes tessellatus*	*Lestes virgatus*	*Orthetrum robustum*
Agriocnemis ruberrima	*Crenigomphus hartmanni*	*Lestinogomphus angustus*	*Orthetrum trinacria*
Allocnemis leucosticta	*Crocothemis erythraea*	*Mesocnemis singularis*	*Palpopleura jucunda*
Anaciaeschna triangulifera	*Crocothemis sanguinolenta*	*Metacnemis valida*	*Palpopleura lucia*
Anax ephippiger	*Diplacodes lefebvrii*	*Nesciothemis farinosa*	*Palpopleura portia*
Anax imperator	*Diplacodes luminans*	*Notiothemis jonesi*	*Pantala flavescens*
Anax speratus	*Elattoneura glauca*	*Notogomphus praetorius*	*Paragomphus cognatus*
Anax tristis	*Gynacantha usambarica*	*Orthetrum abbotti*	*Paragomphus genei*

AT1012: Maputaland-Pondoland Bushland and Thickets (*continued*)

Species	Species	Species	Species
Parazyxomma flavicans	*Pseudagrion hageni*	*Tramea basilaris*	*Trithemis stictica*
Phaon iridipennis	*Pseudagrion hamoni*	*Tramea limbata*	*Urothemis assignata*
Phyllomacromia contumax	*Pseudagrion kersteni*	*Trithemis annulata*	*Urothemis edwardsii*
Pinheyschna subpupillata	*Pseudagrion massaicum*	*Trithemis arteriosa*	*Zosteraeschna minuscula*
Platycypha caligata	*Pseudagrion salisburyense*	*Trithemis donaldsoni*	*Zygonyx natalensis*
Platycypha fitzsimonsi	*Pseudagrion spernatum*	*Trithemis dorsalis*	*Zygonyx torridus*
Proischnura rotundipennis	*Pseudagrion sublacteum*	*Trithemis furva*	*Zyxomma atlanticum*
Pseudagrion caffrum	*Rhyothemis semihyalina*	*Trithemis hecate*	
Pseudagrion citricola	*Sympetrum fonscolombii*	*Trithemis kirbyi*	
Pseudagrion coeleste	*Tetrathemis polleni*	*Trithemis pluvialis*	

AT1013: Ruwenzori-Virunga Montane Moorlands (16 species, 25 records)

Species	Species	Species	Species
Africallagma pseudelongatum	*Atoconeura kenya*	*Palpopleura lucia*	*Stenocypha tenuis*
Africallagma subtile	*Atoconeura pseudeudoxia*	*Palpopleura portia*	*Tramea basilaris*
Anax imperator	*Orthetrum caffrum*	*Pseudagrion kersteni*	*Trithemis arteriosa*
Atoconeura eudoxia	*Orthetrum camerunense*	*Pseudagrion spernatum*	*Trithemis stictica*

AT1014: South Malawi Montane Forest-Grassland Mosaic (96 species, 850 records)

Species	Species	Species	Species
Aciagrion gracile	*Chlorolestes elegans*	*Lestes plagiatus*	*Orthetrum machadoi*
Africallagma glaucum	*Crenigomphus hartmanni*	*Lestes virgatus*	*Orthetrum trinacria*
Africallagma subtile	*Crocothemis divisa*	*Lestinogomphus angustus*	*Palpopleura lucia*
Agriocnemis exilis	*Crocothemis erythraea*	*Mesocnemis singularis*	*Palpopleura portia*
Agriocnemis gratiosa	*Crocothemis sanguinolenta*	*Nepogomphoides stuhlmanni*	*Pantala flavescens*
Allocnemis marshalli	*Crocothemis saxicolor*	*Nesciothemis farinosa*	*Paragomphus cognatus*
Anaciaeschna triangulifera	*Diplacodes lefebvrii*	*Notiothemis jonesi*	*Paragomphus sabicus*
Anax ephippiger	*Diplacodes luminans*	*Notogomphus dendrohyrax*	*Phaon iridipennis*
Anax imperator	*Elattoneura cellularis*	*Notogomphus zernyi*	*Phyllomacromia monoceros*
Anax speratus	*Elattoneura glauca*	*Olpogastra lugubris*	*Phyllomacromia picta*
Anax tristis	*Gomphidia quarrei*	*Oreocnemis phoenix*	*Pinheyschna rileyi*
Atoconeura biordinata	*Gynacantha manderica*	*Orthetrum abbotti*	*Platycypha caligata*
Azuragrion nigridorsum	*Gynacantha villosa*	*Orthetrum brachiale*	*Proischnura subfurcata*
Brachythemis lacustris	*Hemistigma albipunctum*	*Orthetrum caffrum*	*Pseudagrion acaciae*
Bradinopyga cornuta	*Ictinogomphus ferox*	*Orthetrum chrysostigma*	*Pseudagrion coeleste*
Ceriagrion glabrum	*Ischnura senegalensis*	*Orthetrum guineense*	*Pseudagrion commoniae*
Ceriagrion suave	*Lestes amicus*	*Orthetrum hintzi*	*Pseudagrion gamblesi*
Chlorocypha consueta	*Lestes dissimulans*	*Orthetrum julia*	*Pseudagrion glaucescens*

AT1014: South Malawi Montane Forest-Grassland Mosaic (*continued*)

Species	Species	Species	Species
Pseudagrion hageni	*Pseudagrion spernatum*	*Trithemis annulata*	*Trithemis pluvialis*
Pseudagrion hamoni	*Pseudagrion sublacteum*	*Trithemis arteriosa*	*Trithemis werneri*
Pseudagrion inconspicuum	*Rhyothemis semihyalina*	*Trithemis donaldsoni*	*Zosteraeschna usambarica*
Pseudagrion kersteni	*Tetrathemis polleni*	*Trithemis furva*	*Zygonoides fuelleborni*
Pseudagrion massaicum	*Tholymis tillarga*	*Trithemis hecate*	*Zygonyx natalensis*
Pseudagrion salisburyense	*Tramea basilaris*	*Trithemis kirbyi*	*Zygonyx torridus*

AT1015: Southern Rift Montane Forest-Grassland Mosaic (60 species, 217 records)

Species	Species	Species	Species
Aciagrion gracile	*Crocothemis divisa*	*Orthetrum hintzi*	*Pseudagrion hageni*
Aethiothemis bequaerti	*Crocothemis erythraea*	*Orthetrum julia*	*Pseudagrion hamoni*
Africallagma fractum	*Crocothemis sanguinolenta*	*Orthetrum machadoi*	*Pseudagrion inconspicuum*
Africallagma glaucum	*Diplacodes luminans*	*Orthetrum trinacria*	*Pseudagrion kersteni*
Africallagma sinuatum	*Ischnura senegalensis*	*Palpopleura deceptor*	*Pseudagrion massaicum*
Africallagma subtile	*Lestes amicus*	*Palpopleura jucunda*	*Pseudagrion salisburyense*
Allocnemis marshalli	*Lestes plagiatus*	*Palpopleura portia*	*Pseudagrion sjoestedti*
Anax imperator	*Lestes virgatus*	*Pantala flavescens*	*Pseudagrion spernatum*
Anax speratus	*Nesciothemis farinosa*	*Phaon iridipennis*	*Sympetrum fonscolombii*
Atoconeura biordinata	*Notogomphus zernyi*	*Pinheyschna rileyi*	*Tramea basilaris*
Brachythemis leucosticta	*Orthetrum abbotti*	*Platycypha caligata*	*Trithemis annulata*
Ceriagrion glabrum	*Orthetrum brachiale*	*Porpax risi*	*Trithemis arteriosa*
Ceriagrion suave	*Orthetrum caffrum*	*Proischnura subfurcata*	*Trithemis furva*
Chlorocypha consueta	*Orthetrum chrysostigma*	*Pseudagrion acaciae*	*Trithemis stictica*
Crenigomphus hartmanni	*Orthetrum guineense*	*Pseudagrion glaucescens*	*Zosteraeschna usambarica*

AT1201: Albany Thickets (35 species, 142 records)

Species	Species	Species	Species
Africallagma glaucum	*Elattoneura frenulata*	*Orthetrum chrysostigma*	*Sympetrum fonscolombii*
Allocnemis leucosticta	*Elattoneura glauca*	*Orthetrum julia*	*Syncordulia venator*
Ceratogomphus pictus	*Ischnura senegalensis*	*Palpopleura jucunda*	*Tramea limbata*
Ceriagrion glabrum	*Lestes plagiatus*	*Pantala flavescens*	*Trithemis arteriosa*
Chlorolestes fasciatus	*Lestes virgatus*	*Paragomphus genei*	*Trithemis dorsalis*
Chlorolestes tessellatus	*Metacnemis valida*	*Platycypha caligata*	*Trithemis furva*
Chlorolestes umbratus	*Nesciothemis farinosa*	*Pseudagrion furcigerum*	*Trithemis kirbyi*
Crocothemis erythraea	*Notogomphus praetorius*	*Pseudagrion hageni*	*Trithemis stictica*
Crocothemis sanguinolenta	*Orthetrum caffrum*	*Pseudagrion kersteni*	

AT1202: Lowland Fynbos and Renosterveld (63 species, 810 records)

Species	Species	Species	Species
Africallagma glaucum	*Diplacodes lefebvrii*	*Pantala flavescens*	*Sympetrum fonscolombii*
Agriocnemis falcifera	*Ecchlorolestes nylephtha*	*Paragomphus cognatus*	*Syncordulia gracilis*
Allocnemis leucosticta	*Ecchlorolestes peringueyi*	*Paragomphus genei*	*Syncordulia legator*
Anaciaeschna triangulifera	*Elattoneura frenulata*	*Phyllomacromia picta*	*Syncordulia serendipator*
Anax imperator	*Elattoneura glauca*	*Pinheyschna subpupillata*	*Syncordulia venator*
Anax speratus	*Ischnura senegalensis*	*Platycypha caligata*	*Tramea limbata*
Azuragrion nigridorsum	*Lestes plagiatus*	*Platycypha fitzsimonsi*	*Trithemis annulata*
Ceratogomphus pictus	*Lestes virgatus*	*Proischnura polychromatica*	*Trithemis arteriosa*
Ceratogomphus triceraticus	*Nesciothemis farinosa*	*Pseudagrion citricola*	*Trithemis dorsalis*
Ceriagrion glabrum	*Orthetrum abbotti*	*Pseudagrion draconis*	*Trithemis furva*
Chlorolestes conspicuus	*Orthetrum caffrum*	*Pseudagrion furcigerum*	*Trithemis kirbyi*
Chlorolestes fasciatus	*Orthetrum chrysostigma*	*Pseudagrion hageni*	*Trithemis pluvialis*
Chlorolestes tessellatus	*Orthetrum hintzi*	*Pseudagrion kersteni*	*Trithemis stictica*
Chlorolestes umbratus	*Orthetrum julia*	*Pseudagrion massaicum*	*Zosteraeschna minuscula*
Crocothemis erythraea	*Orthetrum trinacria*	*Rhyothemis semihyalina*	*Zygonyx natalensis*
Crocothemis sanguinolenta	*Palpopleura jucunda*	*Spesbona angusta*	

AT1203: Montane Fynbos and Renosterveld (68 species, 2 104 records)

Species	Species	Species	Species
Africallagma glaucum	*Crocothemis sanguinolenta*	*Palpopleura jucunda*	*Spesbona angusta*
Africallagma sapphirinum	*Diplacodes lefebvrii*	*Pantala flavescens*	*Sympetrum fonscolombii*
Agriocnemis falcifera	*Ecchlorolestes nylephtha*	*Paragomphus cognatus*	*Syncordulia gracilis*
Allocnemis leucosticta	*Ecchlorolestes peringueyi*	*Paragomphus genei*	*Syncordulia legator*
Anax imperator	*Elattoneura frenulata*	*Phyllomacromia contumax*	*Syncordulia serendipator*
Anax speratus	*Elattoneura glauca*	*Phyllomacromia picta*	*Syncordulia venator*
Anax tristis	*Ischnura senegalensis*	*Pinheyschna subpupillata*	*Tramea basilaris*
Azuragrion nigridorsum	*Lestes plagiatus*	*Platycypha caligata*	*Tramea limbata*
Ceratogomphus pictus	*Lestes virgatus*	*Platycypha fitzsimonsi*	*Trithemis annulata*
Ceratogomphus triceraticus	*Metacnemis valida*	*Proischnura polychromatica*	*Trithemis arteriosa*
Ceriagrion glabrum	*Nesciothemis farinosa*	*Pseudagrion citricola*	*Trithemis dorsalis*
Chlorolestes conspicuus	*Orthetrum caffrum*	*Pseudagrion draconis*	*Trithemis furva*
Chlorolestes fasciatus	*Orthetrum chrysostigma*	*Pseudagrion furcigerum*	*Trithemis kirbyi*
Chlorolestes tessellatus	*Orthetrum julia*	*Pseudagrion hageni*	*Trithemis pluvialis*
Chlorolestes umbratus	*Orthetrum machadoi*	*Pseudagrion kersteni*	*Trithemis stictica*
Crenigomphus hartmanni	*Orthetrum rubens*	*Pseudagrion massaicum*	*Zosteraeschna minuscula*
Crocothemis erythraea	*Orthetrum trinacria*	*Pseudagrion salisburyense*	*Zygonyx natalensis*

AT1303: East Saharan Montane Xeric Woodlands (20 species, 92 records)

Species	Species	Species	Species
Anax ephippiger	*Ischnura senegalensis*	*Orthetrum caffrum*	*Sympetrum fonscolombii*
Anax speratus	*Lestes ictericus*	*Palpopleura jucunda*	*Trithemis arteriosa*
Crocothemis erythraea	*Nesciothemis farinosa*	*Proischnura subfurcata*	*Trithemis furva*
Crocothemis sanguinolenta	*Orthetrum abbotti*	*Pseudagrion hamoni*	*Trithemis kirbyi*
Diplacodes lefebvrii	*Orthetrum brachiale*	*Pseudagrion kersteni*	*Trithemis stictica*

AT1305: Ethiopian Xeric Grasslands and Shrublands (16 species, 79 records)

Species	Species	Species	Species
Anax ephippiger	*Hemistigma albipunctum*	*Orthetrum chrysostigma*	*Paragomphus genei*
Anax imperator	*Ischnura evansi*	*Orthetrum julia*	*Pseudagrion sublacteum*
Anax speratus	*Ischnura senegalensis*	*Orthetrum sabina*	*Trithemis arteriosa*
Crocothemis erythraea	*Orthetrum brachiale*	*Pantala flavescens*	*Trithemis kirbyi*

AT1307: Hobyo Grasslands and Shrublands (10 species, 13 records)

Species	Species	Species	Species
Anax ephippiger	*Crocothemis erythraea*	*Ischnura senegalensis*	*Urothemis assignata*
Anax imperator	*Diplacodes lefebvrii*	*Pantala flavescens*	
Brachythemis leucosticta	*Diplacodes luminans*	*Rhyothemis semihyalina*	

AT1309: Kalahari Xeric Savanna (67 species, 1 580 records)

Species	Species	Species	Species
Africallagma glaucum	*Crocothemis erythraea*	*Orthetrum caffrum*	*Pseudagrion massaicum*
Agriocnemis exilis	*Crocothemis sanguinolenta*	*Orthetrum chrysostigma*	*Pseudagrion nubicum*
Allocnemis leucosticta	*Diplacodes lefebvrii*	*Orthetrum julia*	*Pseudagrion salisburyense*
Anax ephippiger	*Diplacodes luminans*	*Orthetrum machadoi*	*Pseudagrion sublacteum*
Anax imperator	*Elattoneura glauca*	*Orthetrum trinacria*	*Pseudagrion vaalense*
Anax speratus	*Hemistigma albipunctum*	*Palpopleura deceptor*	*Rhyothemis semihyalina*
Anax tristis	*Ictinogomphus ferox*	*Palpopleura jucunda*	*Sympetrum fonscolombii*
Azuragrion nigridorsum	*Ischnura senegalensis*	*Palpopleura lucia*	*Tholymis tillarga*
Brachythemis leucosticta	*Lestes dissimulans*	*Palpopleura portia*	*Tramea basilaris*
Bradinopyga cornuta	*Lestes pallidus*	*Pantala flavescens*	*Trithemis annulata*
Ceratogomphus pictus	*Mesocnemis singularis*	*Paragomphus cognatus*	*Trithemis arteriosa*
Ceriagrion glabrum	*Nesciothemis farinosa*	*Paragomphus genei*	*Trithemis donaldsoni*
Ceriagrion suave	*Olpogastra lugubris*	*Phyllomacromia picta*	*Trithemis dorsalis*
Chlorolestes fasciatus	*Orthetrum abbotti*	*Pseudagrion citricola*	*Trithemis furva*
Crenigomphus hartmanni	*Orthetrum brachiale*	*Pseudagrion kersteni*	*Trithemis hecate*

AT1309: Kalahari Xeric Savanna (*continued*)

Species	Species	Species	Species
Trithemis kirbyi	*Trithemis stictica*	*Urothemis edwardsii*	*Zygonyx torridus*
Trithemis monardi	*Urothemis assignata*	*Zosteraeschna minuscula*	

AT1310: Kaokoveld Desert (13 species, 39 records)

Species	Species	Species	Species
Anax imperator	*Ischnura senegalensis*	*Paragomphus genei*	*Trithemis kirbyi*
Brachythemis leucosticta	*Lestes pallidus*	*Pseudagrion sublacteum*	
Crocothemis erythraea	*Orthetrum chrysostigma*	*Sympetrum fonscolombii*	
Diplacodes lefebvrii	*Orthetrum trinacria*	*Trithemis annulata*	

AT1313: Masai Xeric Grasslands and Shrublands (10 species, 17 records)

Species	Species	Species	Species
Agriocnemis sania	*Brachythemis lacustris*	*Lestes pallidus*	*Paragomphus pumilio*
Anax ephippiger	*Crocothemis erythraea*	*Olpogastra lugubris*	
Brachythemis impartita	*Diplacodes luminans*	*Pantala flavescens*	

AT1314: Nama Karoo (57 species, 610 records)

Species	Species	Species	Species
Africallagma glaucum	*Elattoneura glauca*	*Phyllomacromia picta*	*Tholymis tillarga*
Africallagma sapphirinum	*Ictinogomphus ferox*	*Pinheyschna subpupillata*	*Tramea basilaris*
Allocnemis leucosticta	*Ischnura senegalensis*	*Platycypha caligata*	*Tramea limbata*
Anax ephippiger	*Lestes pallidus*	*Pseudagrion acaciae*	*Trithemis annulata*
Anax imperator	*Lestes plagiatus*	*Pseudagrion citricola*	*Trithemis arteriosa*
Anax speratus	*Mesocnemis singularis*	*Pseudagrion draconis*	*Trithemis dorsalis*
Azuragrion nigridorsum	*Nesciothemis farinosa*	*Pseudagrion hageni*	*Trithemis furva*
Brachythemis leucosticta	*Orthetrum caffrum*	*Pseudagrion kersteni*	*Trithemis kirbyi*
Ceratogomphus pictus	*Orthetrum chrysostigma*	*Pseudagrion massaicum*	*Trithemis stictica*
Chlorolestes fasciatus	*Orthetrum julia*	*Pseudagrion salisburyense*	*Trithemis werneri*
Chlorolestes umbratus	*Orthetrum trinacria*	*Pseudagrion spernatum*	*Zosteraeschna minuscula*
Crenigomphus hartmanni	*Palpopleura jucunda*	*Pseudagrion sublacteum*	*Zygonyx torridus*
Crocothemis erythraea	*Pantala flavescens*	*Pseudagrion vaalense*	
Crocothemis sanguinolenta	*Paragomphus cognatus*	*Rhyothemis semihyalina*	
Diplacodes lefebvrii	*Paragomphus genei*	*Sympetrum fonscolombii*	

AT1315: Namib Desert (23 species, 172 records)

Species	Species	Species	Species
Anax ephippiger	*Lestes pallidus*	*Pseudagrion massaicum*	*Trithemis hecate*
Anax imperator	*Orthetrum chrysostigma*	*Sympetrum fonscolombii*	*Trithemis kirbyi*
Anax speratus	*Orthetrum julia*	*Tholymis tillarga*	*Urothemis edwardsii*
Crocothemis erythraea	*Orthetrum trinacria*	*Trithemis annulata*	*Zosteraeschna minuscula*
Diplacodes lefebvrii	*Pantala flavescens*	*Trithemis arteriosa*	*Zygonyx torridus*
Ischnura senegalensis	*Paragomphus genei*	*Trithemis furva*	

AT1316: Namibian Savanna Woodlands (70 species, 2 363 records)

Species	Species	Species	Species
Africallagma glaucum	*Ictinogomphus ferox*	*Paragomphus elpidius*	*Tramea limbata*
Agriocnemis exilis	*Ischnura senegalensis*	*Paragomphus genei*	*Trithemis annulata*
Anax ephippiger	*Lestes pallidus*	*Phaon iridipennis*	*Trithemis arteriosa*
Anax imperator	*Mesocnemis singularis*	*Phyllogomphus selysi*	*Trithemis donaldsoni*
Anax speratus	*Nesciothemis farinosa*	*Phyllomacromia contumax*	*Trithemis furva*
Anax tristis	*Olpogastra lugubris*	*Phyllomacromia picta*	*Trithemis hecate*
Azuragrion nigridorsum	*Orthetrum abbotti*	*Pseudagrion acaciae*	*Trithemis kirbyi*
Brachythemis lacustris	*Orthetrum brachiale*	*Pseudagrion glaucescens*	*Trithemis monardi*
Brachythemis leucosticta	*Orthetrum chrysostigma*	*Pseudagrion hamoni*	*Trithemis stictica*
Bradinopyga cornuta	*Orthetrum julia*	*Pseudagrion kersteni*	*Trithemis werneri*
Ceratogomphus pictus	*Orthetrum machadoi*	*Pseudagrion massaicum*	*Urothemis assignata*
Ceriagrion glabrum	*Orthetrum trinacria*	*Pseudagrion nubicum*	*Urothemis edwardsii*
Crocothemis erythraea	*Palpopleura deceptor*	*Pseudagrion salisburyense*	*Zosteraeschna minuscula*
Crocothemis sanguinolenta	*Palpopleura jucunda*	*Pseudagrion sublacteum*	*Zygonoides fuelleborni*
Diplacodes lefebvrii	*Palpopleura lucia*	*Rhyothemis semihyalina*	*Zygonyx natalensis*
Diplacodes luminans	*Pantala flavescens*	*Sympetrum fonscolombii*	*Zygonyx torridus*
Elattoneura glauca	*Paragomphus cataractae*	*Tholymis tillarga*	
Hemistigma albipunctum	*Paragomphus cognatus*	*Tramea basilaris*	

AT1317: Red Sea Coastal Desert (8 species, 19 records)

Species	Species	Species	Species
Anax ephippiger	*Crocothemis erythraea*	*Orthetrum ransonnetii*	*Sympetrum fonscolombii*
Anax imperator	*Ischnura senegalensis*	*Pantala flavescens*	*Trithemis arteriosa*

AT1319: Somali Montane Xeric Woodlands (18 species, 54 records)

Species	Species	Species	Species
Anax ephippiger	*Anax speratus*	*Ischnura senegalensis*	*Orthetrum abbotti*
Anax imperator	*Crocothemis erythraea*	*Nesciothemis farinosa*	*Orthetrum brachiale*

AT1319: Somali Montane Xeric Woodlands (*continued*)

Species	Species	Species	Species
Orthetrum chrysostigma	*Orthetrum stemmale*	*Trithemis arteriosa*	*Trithemis stictica*
Orthetrum guineense	*Pantala flavescens*	*Trithemis furva*	
Orthetrum sabina	*Pseudagrion kersteni*	*Trithemis kirbyi*	

AT1322: Succulent Karoo (39 species, 160 records)

Species	Species	Species	Species
Africallagma glaucum	*Crocothemis sanguinolenta*	*Pantala flavescens*	*Sympetrum fonscolombii*
Anax imperator	*Diplacodes lefebvrii*	*Paragomphus cognatus*	*Trithemis annulata*
Anax speratus	*Elattoneura frenulata*	*Paragomphus genei*	*Trithemis arteriosa*
Brachythemis lacustris	*Elattoneura glauca*	*Phyllomacromia picta*	*Trithemis dorsalis*
Ceratogomphus pictus	*Ischnura senegalensis*	*Pseudagrion citricola*	*Trithemis furva*
Ceratogomphus triceraticus	*Nesciothemis farinosa*	*Pseudagrion draconis*	*Trithemis kirbyi*
Ceriagrion glabrum	*Orthetrum caffrum*	*Pseudagrion kersteni*	*Trithemis pluvialis*
Chlorolestes conspicuus	*Orthetrum chrysostigma*	*Pseudagrion massaicum*	*Trithemis stictica*
Chlorolestes umbratus	*Orthetrum julia*	*Pseudagrion salisburyense*	*Zosteraeschna minuscula*
Crocothemis erythraea	*Orthetrum trinacria*	*Pseudagrion vaalense*	

AT1401: Central African Mangroves (81 species, 199 records)

Species	Species	Species	Species
Aciagrion africanum	*Crocothemis erythraea*	*Olpogastra lugubris*	*Pseudagrion glaucescens*
Acisoma inflatum	*Diastatomma tricolor*	*Orthetrum africanum*	*Pseudagrion glaucoideum*
Acisoma trifidum	*Diplacodes deminuta*	*Orthetrum austeni*	*Pseudagrion glaucum*
Aethiothemis incongruens	*Diplacodes lefebvrii*	*Orthetrum brachiale*	*Pseudagrion isidromorai*
Aethriamanta rezia	*Diplacodes luminans*	*Orthetrum chrysostigma*	*Pseudagrion simonae*
Agriocnemis maclachlani	*Elattoneura josemorai*	*Orthetrum guineense*	*Rhyothemis fenestrina*
Agriocnemis zerafica	*Elattoneura vittata*	*Orthetrum icteromelas*	*Rhyothemis notata*
Allocnemis nigripes	*Gynacantha cylindrata*	*Orthetrum microstigma*	*Sapho bicolor*
Anax chloromelas	*Gynacantha sextans*	*Orthetrum stemmale*	*Sapho gloriosa*
Anax imperator	*Hadrothemis coacta*	*Orthetrum trinacria*	*Sapho orichalcea*
Brachythemis lacustris	*Hadrothemis defecta*	*Oxythemis phoenicosceles*	*Tetrathemis camerunensis*
Bradinopyga strachani	*Hadrothemis infesta*	*Palpopleura lucia*	*Thermochoria equivocata*
Ceriagrion annulatum	*Hadrothemis versuta*	*Palpopleura portia*	*Tholymis tillarga*
Ceriagrion corallinum	*Heliaeschna fuliginosa*	*Pantala flavescens*	*Tramea basilaris*
Ceriagrion glabrum	*Hemistigma albipunctum*	*Phaon camerunensis*	*Trithemis aconita*
Ceriagrion rubellocerinum	*Ischnura senegalensis*	*Phaon iridipennis*	*Trithemis annulata*
Chalcostephia flavifrons	*Micromacromia camerunica*	*Phyllomacromia melania*	*Trithemis arteriosa*
Chlorocypha cyanifrons	*Micromacromia zygoptera*	*Porpax asperipes*	*Trithemis grouti*
Crocothemis divisa	*Neodythemis preussi*	*Pseudagrion camerunense*	*Trithemis hartwigi*

AT1401: Central African Mangroves (*continued*)

Species	Species
Trithemis kirbyi	*Urothemis edwardsii*
Umma longistigma	*Zyxomma atlanticum*
Urothemis assignata	

AT1402: East African Mangroves (42 species, 98 records)

Species	Species	Species	Species
Agriocnemis exilis	*Diplacodes lefebvrii*	*Orthetrum julia*	*Pseudagrion lindicum*
Anax ephippiger	*Hemistigma albipunctum*	*Orthetrum stemmale*	*Rhyothemis semihyalina*
Anax imperator	*Ictinogomphus ferox*	*Orthetrum trinacria*	*Tetrathemis polleni*
Anax tristis	*Ischnura senegalensis*	*Palpopleura lucia*	*Tholymis tillarga*
Azuragrion nigridorsum	*Lestes ictericus*	*Pantala flavescens*	*Tramea basilaris*
Brachythemis leucosticta	*Lestes pallidus*	*Paragomphus genei*	*Tramea limbata*
Bradinopyga cornuta	*Lestes plagiatus*	*Phaon iridipennis*	*Trithemis annulata*
Ceriagrion glabrum	*Nesciothemis farinosa*	*Pseudagrion acaciae*	*Urothemis assignata*
Chalcostephia flavifrons	*Orthetrum brachiale*	*Pseudagrion coeleste*	*Urothemis edwardsii*
Coryphagrion grandis	*Orthetrum hintzi*	*Pseudagrion hageni*	
Crocothemis erythraea	*Orthetrum icteromelas*	*Pseudagrion kersteni*	

AT1403: Guinean Mangroves (74 species, 456 records)

Species	Species	Species	Species
Acisoma inflatum	*Copera sikassoensis*	*Orthetrum angustiventre*	*Pseudagrion hamoni*
Acisoma trifidum	*Crocothemis divisa*	*Orthetrum austeni*	*Pseudagrion melanicterum*
Aethiothemis solitaria	*Crocothemis erythraea*	*Orthetrum brachiale*	*Pseudagrion sublacteum*
Agriocnemis exilis	*Diplacodes lefebvrii*	*Orthetrum chrysostigma*	*Rhyothemis notata*
Agriocnemis maclachlani	*Diplacodes luminans*	*Orthetrum hintzi*	*Rhyothemis semihyalina*
Agriocnemis victoria	*Gynacantha cylindrata*	*Orthetrum icteromelas*	*Tetrathemis camerunensis*
Agriocnemis zerafica	*Gynacantha manderica*	*Orthetrum julia*	*Tholymis tillarga*
Anax ephippiger	*Hadrothemis defecta*	*Orthetrum microstigma*	*Tramea basilaris*
Anax imperator	*Heliaeschna fuliginosa*	*Orthetrum monardi*	*Tramea limbata*
Anax tristis	*Hemistigma albipunctum*	*Orthetrum stemmale*	*Trithemis annulata*
Brachythemis impartita	*Ischnura senegalensis*	*Orthetrum trinacria*	*Trithemis arteriosa*
Brachythemis lacustris	*Lestes ictericus*	*Palpopleura deceptor*	*Trithemis grouti*
Brachythemis leucosticta	*Lestes ochraceus*	*Palpopleura lucia*	*Trithemis hecate*
Bradinopyga strachani	*Lestes pallidus*	*Palpopleura portia*	*Trithemis imitata*
Ceriagrion corallinum	*Neodythemis klingi*	*Pantala flavescens*	*Trithemis pruinata*
Ceriagrion glabrum	*Neophya rutherfordi*	*Parazyxomma flavicans*	*Urothemis assignata*
Ceriagrion suave	*Nesciothemis nigeriensis*	*Phyllomacromia melania*	*Urothemis edwardsii*
Chalcostephia flavifrons	*Orthetrum abbotti*	*Pseudagrion camerunense*	
Chlorocypha rubida	*Orthetrum africanum*	*Pseudagrion glaucescens*	

AT1405: Southern African Mangroves (73 species, 680 records)

Species	Species	Species	Species
Acisoma inflatum	*Diplacodes luminans*	*Orthetrum icteromelas*	*Pseudagrion massaicum*
Acisoma variegatum	*Diplacodes pumila*	*Orthetrum julia*	*Rhyothemis semihyalina*
Aethriamanta rezia	*Elattoneura glauca*	*Orthetrum machadoi*	*Tetrathemis polleni*
Africallagma glaucum	*Gynacantha manderica*	*Orthetrum robustum*	*Tramea basilaris*
Agriocnemis exilis	*Gynacantha usambarica*	*Orthetrum stemmale*	*Tramea limbata*
Agriocnemis falcifera	*Hemicordulia africana*	*Orthetrum trinacria*	*Trithemis aconita*
Agriocnemis gratiosa	*Hemistigma albipunctum*	*Palpopleura lucia*	*Trithemis annulata*
Agriocnemis ruberrima	*Ictinogomphus ferox*	*Palpopleura portia*	*Trithemis arteriosa*
Allocnemis leucosticta	*Ischnura senegalensis*	*Pantala flavescens*	*Trithemis furva*
Anaciaeschna triangulifera	*Lestes pallidus*	*Paragomphus cognatus*	*Trithemis hecate*
Anax ephippiger	*Lestes plagiatus*	*Paragomphus genei*	*Trithemis kirbyi*
Anax imperator	*Lestes tridens*	*Parazyxomma flavicans*	*Trithemis stictica*
Anax tristis	*Lestes uncifer*	*Phaon iridipennis*	*Urothemis assignata*
Azuragrion nigridorsum	*Lestes virgatus*	*Phyllomacromia contumax*	*Urothemis edwardsii*
Brachythemis leucosticta	*Macrodiplax cora*	*Platycypha caligata*	*Urothemis luciana*
Ceriagrion glabrum	*Nesciothemis farinosa*	*Pseudagrion coeleste*	*Zyxomma atlanticum*
Chalcostephia flavifrons	*Orthetrum brachiale*	*Pseudagrion hageni*	
Crocothemis erythraea	*Orthetrum chrysostigma*	*Pseudagrion hamoni*	
Diplacodes lefebvrii	*Orthetrum hintzi*	*Pseudagrion kersteni*	

AT9898: Lake: Afrotropic (124 species, 460 records)

Species	Species	Species	Species
Aciagrion gracile	*Anax chloromelas*	*Crocothemis erythraea*	*Lestes ochraceus*
Acisoma trifidum	*Anax ephippiger*	*Crocothemis sanguinolenta*	*Lestes pallidus*
Aethiothemis bequaerti	*Anax imperator*	*Diplacodes deminuta*	*Lestes pinheyi*
Aethiothemis solitaria	*Anax speratus*	*Diplacodes lefebvrii*	*Lestes virgatus*
Aethriamanta rezia	*Anax tristis*	*Diplacodes luminans*	*Lestinogomphus angustus*
Africallagma elongatum	*Brachythemis impartita*	*Elattoneura cellularis*	*Mesocnemis singularis*
Africallagma pseudelongatum	*Brachythemis lacustris*	*Elattoneura glauca*	*Microgomphus nyassicus*
Africallagma sinuatum	*Brachythemis leucosticta*	*Gynacantha bullata*	*Nesciothemis farinosa*
Africallagma subtile	*Brachythemis wilsoni*	*Gynacantha manderica*	*Notogomphus dendrohyrax*
Agriocnemis exilis	*Bradinopyga cornuta*	*Gynacantha usambarica*	*Orthetrum brachiale*
Agriocnemis forcipata	*Ceriagrion glabrum*	*Gynacantha vesiculata*	*Orthetrum caffrum*
Agriocnemis gratiosa	*Ceriagrion kordofanicum*	*Gynacantha villosa*	*Orthetrum chrysostigma*
Agriocnemis inversa	*Ceriagrion suave*	*Hadrothemis defecta*	*Orthetrum guineense*
Agriocnemis maclachlani	*Chalcostephia flavifrons*	*Hadrothemis scabrifrons*	*Orthetrum hintzi*
Agriocnemis sania	*Chlorocypha consueta*	*Hemicordulia africana*	*Orthetrum icteromelas*
Agriocnemis victoria	*Copera nyansana*	*Hemistigma albipunctum*	*Orthetrum julia*
Allocnemis abbotti	*Crenigomphus renei*	*Ictinogomphus ferox*	*Orthetrum microstigma*
Allocnemis marshalli	*Crocothemis divisa*	*Ischnura senegalensis*	*Orthetrum stemmale*

AT9898: Lake: Afrotropic (*continued*)

Species	Species	Species	Species
Orthetrum trinacria	*Phyllomacromia melania*	*Pseudagrion sjoestedti*	*Trithemis dorsalis*
Palpopleura deceptor	*Phyllomacromia monoceros*	*Pseudagrion spernatum*	*Trithemis hecate*
Palpopleura jucunda	*Phyllomacromia picta*	*Pseudagrion sublacteum*	*Trithemis kirbyi*
Palpopleura lucia	*Platycypha caligata*	*Pseudagrion torridum*	*Trithemis pluvialis*
Palpopleura portia	*Platycypha pinheyi*	*Rhyothemis fenestrina*	*Trithemis stictica*
Pantala flavescens	*Proischnura subfurcata*	*Rhyothemis semihyalina*	*Trithemis werneri*
Paragomphus cognatus	*Pseudagrion glaucescens*	*Stenocypha tenuis*	*Trithetrum navasi*
Paragomphus genei	*Pseudagrion hageni*	*Teinobasis alluaudi*	*Urothemis assignata*
Paragomphus nyasicus	*Pseudagrion kersteni*	*Thermochoria equivocata*	*Urothemis edwardsii*
Paragomphus pumilio	*Pseudagrion kibalense*	*Tholymis tillarga*	*Zosteraeschna ellioti*
Phaon iridipennis	*Pseudagrion massaicum*	*Tramea basilaris*	*Zygonoides fuelleborni*
Phyllogomphus selysi	*Pseudagrion niloticum*	*Trithemis annulata*	*Zygonyx natalensis*
Phyllomacromia contumax	*Pseudagrion nubicum*	*Trithemis arteriosa*	*Zygonyx torridus*

PA0513: Mediterranean Conifer and Mixed Forests (53 species, 727 records)

Species	Species	Species	Species
Aeshna affinis	*Coenagrion puella*	*Lestes barbarus*	*Paragomphus genei*
Aeshna isoceles	*Coenagrion scitulum*	*Lestes dryas*	*Platycnemis subdilatata*
Aeshna mixta	*Cordulegaster boltonii*	*Lestes numidicus*	*Pyrrhosoma nymphula*
Anax ephippiger	*Cordulegaster princeps*	*Lestes virens*	*Sympecma fusca*
Anax imperator	*Crocothemis erythraea*	*Libellula quadrimaculata*	*Sympetrum fonscolombii*
Anax parthenope	*Diplacodes lefebvrii*	*Onychogomphus costae*	*Sympetrum meridionale*
Boyeria irene	*Enallagma deserti*	*Onychogomphus forcipatus*	*Sympetrum sanguineum*
Brachythemis impartita	*Erythromma lindenii*	*Onychogomphus uncatus*	*Sympetrum striolatum*
Calopteryx exul	*Erythromma viridulum*	*Orthetrum brunneum*	*Trithemis annulata*
Calopteryx haemorrhoidalis	*Gomphus lucasii*	*Orthetrum cancellatum*	*Trithemis arteriosa*
Ceriagrion tenellum	*Ischnura fountaineae*	*Orthetrum chrysostigma*	*Trithemis kirbyi*
Chalcolestes viridis	*Ischnura graellsii*	*Orthetrum coerulescens*	
Coenagrion caerulescens	*Ischnura pumilio*	*Orthetrum nitidinerve*	
Coenagrion mercuriale	*Ischnura saharensis*	*Orthetrum trinacria*	

PA0904: Nile Delta Flooded Savanna (26 species, 431 records)

Species	Species	Species	Species
Aeshna mixta	*Crocothemis erythraea*	*Orthetrum ransonnetii*	*Pseudagrion torridum*
Agriocnemis sania	*Diplacodes lefebvrii*	*Orthetrum sabina*	*Selysiothemis nigra*
Anax ephippiger	*Ischnura senegalensis*	*Orthetrum trinacria*	*Sympetrum fonscolombii*
Anax imperator	*Lestes virens*	*Pantala flavescens*	*Trithemis annulata*
Anax parthenope	*Mesocnemis robusta*	*Paragomphus pumilio*	*Trithemis arteriosa*
Brachythemis impartita	*Nesciothemis farinosa*	*Pseudagrion niloticum*	
Ceriagrion glabrum	*Orthetrum chrysostigma*	*Pseudagrion nubicum*	

PA0905: Saharan Halophytics (26 species, 675 records)

Species	Species	Species	Species
Anax ephippiger	*Erythromma lindenii*	*Orthetrum machadoi*	*Sympetrum meridionale*
Anax imperator	*Ischnura evansi*	*Orthetrum sabina*	*Sympetrum sinaiticum*
Anax parthenope	*Ischnura fountaineae*	*Orthetrum trinacria*	*Trithemis annulata*
Coenagrion caerulescens	*Ischnura graellsii*	*Pantala flavescens*	*Trithemis arteriosa*
Coenagrion scitulum	*Ischnura saharensis*	*Paragomphus genei*	*Trithemis kirbyi*
Crocothemis erythraea	*Orthetrum chrysostigma*	*Selysiothemis nigra*	
Diplacodes lefebvrii	*Orthetrum coerulescens*	*Sympetrum fonscolombii*	

PA1010: Mediterranean High Atlas Juniper Steppe (6 species, 17 records)

Species	Species	Species
Anax imperator	*Cordulegaster princeps*	*Ischnura saharensis*
Coenagrion caerulescens	*Enallagma deserti*	*Sympetrum fonscolombii*

PA1212: Mediterranean Acacia-Argania Dry Woodlands and Succulent Thickets (43 species; 802 records)

Species	Species	Species	Species
Aeshna mixta	*Cordulegaster princeps*	*Onychogomphus uncatus*	*Platycnemis subdilatata*
Anax ephippiger	*Crocothemis erythraea*	*Orthetrum brunneum*	*Pseudagrion sublacteum*
Anax imperator	*Enallagma deserti*	*Orthetrum cancellatum*	*Sympecma fusca*
Anax parthenope	*Erythromma lindenii*	*Orthetrum chrysostigma*	*Sympetrum fonscolombii*
Boyeria irene	*Ischnura graellsii*	*Orthetrum coerulescens*	*Sympetrum meridionale*
Brachythemis impartita	*Ischnura pumilio*	*Orthetrum nitidinerve*	*Sympetrum sinaiticum*
Calopteryx haemorrhoidalis	*Ischnura saharensis*	*Orthetrum ransonnetii*	*Trithemis annulata*
Ceriagrion tenellum	*Lestes barbarus*	*Orthetrum sabina*	*Trithemis arteriosa*
Chalcolestes viridis	*Libellula quadrimaculata*	*Orthetrum trinacria*	*Trithemis kirbyi*
Coenagrion caerulescens	*Onychogomphus costae*	*Pantala flavescens*	*Zygonyx torridus*
Coenagrion scitulum	*Onychogomphus forcipatus*	*Paragomphus genei*	

PA1213: Mediterranean Dry Woodlands and Steppe (52 species, 779 records)

Species	Species	Species	Species
Acisoma inflatum	*Calopteryx exul*	*Coenagrion puella*	*Erythromma lindenii*
Agriocnemis sania	*Calopteryx haemorrhoidalis*	*Coenagrion scitulum*	*Erythromma viridulum*
Anax ephippiger	*Ceriagrion tenellum*	*Cordulegaster boltonii*	*Ischnura fountaineae*
Anax imperator	*Chalcolestes viridis*	*Crocothemis erythraea*	*Ischnura graellsii*
Anax parthenope	*Coenagrion caerulescens*	*Diplacodes lefebvrii*	*Ischnura pumilio*
Brachythemis impartita	*Coenagrion mercuriale*	*Enallagma deserti*	*Ischnura saharensis*

PA1213: Mediterranean Dry Woodlands and Steppe (*continued*)

Species	Species	Species	Species
Ischnura senegalensis	*Orthetrum chrysostigma*	*Platycnemis subdilatata*	*Sympetrum sanguineum*
Lestes barbarus	*Orthetrum coerulescens*	*Pseudagrion nubicum*	*Sympetrum sinaiticum*
Nesciothemis farinosa	*Orthetrum nitidinerve*	*Pseudagrion torridum*	*Sympetrum striolatum*
Onychogomphus costae	*Orthetrum ransonnetii*	*Selysiothemis nigra*	*Trithemis annulata*
Onychogomphus forcipatus	*Orthetrum sabina*	*Sympecma fusca*	*Trithemis arteriosa*
Orthetrum brunneum	*Orthetrum trinacria*	*Sympetrum fonscolombii*	*Trithemis kirbyi*
Orthetrum cancellatum	*Paragomphus genei*	*Sympetrum meridionale*	*Zygonyx torridus*

PA1214: Mediterranean Woodlands and Forests (64 species, 4 745 records)

Species	Species	Species	Species
Aeshna affinis	*Coenagrion puella*	*Lestes numidicus*	*Platycnemis subdilatata*
Aeshna cyanea	*Coenagrion scitulum*	*Lestes virens*	*Pseudagrion sublacteum*
Aeshna isoceles	*Cordulegaster boltonii*	*Libellula quadrimaculata*	*Pyrrhosoma nymphula*
Aeshna mixta	*Cordulegaster princeps*	*Lindenia tetraphylla*	*Rhyothemis semihyalina*
Anax ephippiger	*Crocothemis erythraea*	*Onychogomphus costae*	*Selysiothemis nigra*
Anax imperator	*Diplacodes lefebvrii*	*Onychogomphus forcipatus*	*Sympecma fusca*
Anax parthenope	*Enallagma deserti*	*Onychogomphus uncatus*	*Sympetrum fonscolombii*
Boyeria irene	*Erythromma lindenii*	*Orthetrum brunneum*	*Sympetrum meridionale*
Brachythemis impartita	*Erythromma viridulum*	*Orthetrum cancellatum*	*Sympetrum sanguineum*
Calopteryx exul	*Gomphus lucasii*	*Orthetrum chrysostigma*	*Sympetrum sinaiticum*
Calopteryx haemorrhoidalis	*Ischnura fountaineae*	*Orthetrum coerulescens*	*Sympetrum striolatum*
Calopteryx virgo	*Ischnura graellsii*	*Orthetrum nitidinerve*	*Trithemis annulata*
Ceriagrion tenellum	*Ischnura pumilio*	*Orthetrum ransonnetii*	*Trithemis arteriosa*
Chalcolestes viridis	*Ischnura saharensis*	*Orthetrum sabina*	*Trithemis kirbyi*
Coenagrion caerulescens	*Lestes barbarus*	*Orthetrum trinacria*	*Urothemis edwardsii*
Coenagrion mercuriale	*Lestes dryas*	*Paragomphus genei*	*Zygonyx torridus*

PA1304: Atlantic Coastal Desert (8 species, 21 records)

Species	Species	Species	Species
Anax ephippiger	*Brachythemis impartita*	*Diplacodes lefebvrii*	*Sympetrum fonscolombii*
Anax parthenope	*Crocothemis erythraea*	*Ischnura saharensis*	*Trithemis annulata*

PA1321: North Saharan Steppe and Woodlands (38 species, 944 records)

Species	Species	Species	Species
Aeshna mixta	*Anax imperator*	*Brachythemis impartita*	*Coenagrion caerulescens*
Anax ephippiger	*Anax parthenope*	*Calopteryx haemorrhoidalis*	*Crocothemis erythraea*

PA1321: North Saharan Steppe and Woodlands (*continued*)

Species	Species	Species	Species
Erythromma lindenii	*Orthetrum chrysostigma*	*Platycnemis subdilatata*	*Sympetrum sinaiticum*
Ischnura fountaineae	*Orthetrum coerulescens*	*Pseudagrion niloticum*	*Sympetrum striolatum*
Ischnura graellsii	*Orthetrum nitidinerve*	*Pseudagrion nubicum*	*Trithemis annulata*
Ischnura saharensis	*Orthetrum ransonnetii*	*Pseudagrion torridum*	*Trithemis arteriosa*
Ischnura senegalensis	*Orthetrum sabina*	*Selysiothemis nigra*	*Trithemis kirbyi*
Nesciothemis farinosa	*Orthetrum trinacria*	*Sympecma fusca*	
Onychogomphus costae	*Pantala flavescens*	*Sympetrum fonscolombii*	
Orthetrum brunneum	*Paragomphus genei*	*Sympetrum meridionale*	

PA1327: Sahara Desert (33 species, 748 records)

Species	Species	Species	Species
Agriocnemis sania	*Ischnura evansi*	*Orthetrum trinacria*	*Sympecma fusca*
Anax ephippiger	*Ischnura fountaineae*	*Pantala flavescens*	*Sympetrum fonscolombii*
Anax imperator	*Ischnura saharensis*	*Paragomphus genei*	*Sympetrum sinaiticum*
Anax parthenope	*Ischnura senegalensis*	*Paragomphus pumilio*	*Trithemis annulata*
Brachythemis impartita	*Nesciothemis farinosa*	*Pseudagrion hamoni*	*Trithemis arteriosa*
Brachythemis leucosticta	*Orthetrum chrysostigma*	*Pseudagrion niloticum*	*Trithemis kirbyi*
Ceriagrion glabrum	*Orthetrum coerulescens*	*Pseudagrion nubicum*	
Crocothemis erythraea	*Orthetrum ransonnetii*	*Pseudagrion torridum*	
Diplacodes lefebvrii	*Orthetrum sabina*	*Selysiothemis nigra*	

PA1329: South Saharan Steppe and Woodlands (13 species, 69 records)

Species	Species	Species	Species
Anax ephippiger	*Nesciothemis farinosa*	*Pseudagrion hamoni*	*Trithemis arteriosa*
Anax imperator	*Pantala flavescens*	*Pseudagrion niloticum*	
Brachythemis leucosticta	*Paragomphus pumilio*	*Pseudagrion torridum*	
Mesocnemis robusta	*Paragomphus sinaiticus*	*Trithemis annulata*	

PA1331: Tibesti-Jebel Uweinat Montane Xeric Woodlands (6 species, 29 records)

Species	Species	Species
Anax ephippiger	*Orthetrum ransonnetii*	*Trithemis arteriosa*
Crocothemis erythraea	*Sympetrum fonscolombii*	*Trithemis kirbyi*

PA1332: West Saharan Montane Xeric Woodlands (19 species, 364 records)

Species	Species	Species	Species
Anax ephippiger	*Ischnura senegalensis*	*Orthetrum trinacria*	*Sympetrum sinaiticum*
Anax imperator	*Orthetrum brachiale*	*Pantala flavescens*	*Trithemis annulata*
Anax parthenope	*Orthetrum chrysostigma*	*Paragomphus sinaiticus*	*Trithemis arteriosa*
Crocothemis erythraea	*Orthetrum coerulescens*	*Pseudagrion hamoni*	*Trithemis kirbyi*
Ischnura saharensis	*Orthetrum ransonnetii*	*Sympetrum fonscolombii*	

APPENDIX D4: Lists of dragonfly species recorded within the freshwater ecoregions of Africa.

The documented dragonfly species assemblages according to the freshwater ecoregions of Africa. The African continent is represented by 78 freshwater ecoregions, as described by Abell *et al.* (2008). Below are the 78 freshwater ecoregions with the specific dragonfly species (Anisoptera and Zygoptera) recorded within their boundaries. These records are presented as species lists according to the various ecoregions.

FW501: Atlantic Northwest Africa (60 species, 3 726 records)

Species	Species	Species	Species
Aeshna affinis	*Coenagrion mercuriale*	*Lestes dryas*	*Paragomphus genei*
Aeshna cyanea	*Coenagrion puella*	*Lestes virens*	*Platycnemis subdilatata*
Aeshna isoceles	*Coenagrion scitulum*	*Libellula quadrimaculata*	*Pseudagrion sublacteum*
Aeshna mixta	*Cordulegaster boltonii*	*Onychogomphus costae*	*Pyrrhosoma nymphula*
Anax ephippiger	*Cordulegaster princeps*	*Onychogomphus forcipatus*	*Selysiothemis nigra*
Anax imperator	*Crocothemis erythraea*	*Onychogomphus uncatus*	*Sympecma fusca*
Anax parthenope	*Diplacodes lefebvrii*	*Orthetrum brunneum*	*Sympetrum fonscolombii*
Boyeria irene	*Enallagma deserti*	*Orthetrum cancellatum*	*Sympetrum meridionale*
Brachythemis impartita	*Erythromma lindenii*	*Orthetrum chrysostigma*	*Sympetrum sanguineum*
Calopteryx exul	*Erythromma viridulum*	*Orthetrum coerulescens*	*Sympetrum sinaiticum*
Calopteryx haemorrhoidalis	*Ischnura fountaineae*	*Orthetrum nitidinerve*	*Sympetrum striolatum*
Calopteryx virgo	*Ischnura graellsii*	*Orthetrum ransonnetii*	*Trithemis annulata*
Ceriagrion tenellum	*Ischnura pumilio*	*Orthetrum sabina*	*Trithemis arteriosa*
Chalcolestes viridis	*Ischnura saharensis*	*Orthetrum trinacria*	*Trithemis kirbyi*
Coenagrion caerulescens	*Lestes barbarus*	*Pantala flavescens*	*Zygonyx torridus*

FW502: Mediterranean Northwest Africa (62 species, 4 112 records)

Species	Species	Species	Species
Aeshna affinis	*Chalcolestes viridis*	*Ischnura graellsii*	*Orthetrum chrysostigma*
Aeshna cyanea	*Coenagrion caerulescens*	*Ischnura pumilio*	*Orthetrum coerulescens*
Aeshna isoceles	*Coenagrion mercuriale*	*Ischnura saharensis*	*Orthetrum nitidinerve*
Aeshna mixta	*Coenagrion puella*	*Lestes barbarus*	*Orthetrum ransonnetii*
Anax ephippiger	*Coenagrion scitulum*	*Lestes dryas*	*Orthetrum sabina*
Anax imperator	*Cordulegaster boltonii*	*Lestes numidicus*	*Orthetrum trinacria*
Anax parthenope	*Crocothemis erythraea*	*Lestes virens*	*Pantala flavescens*
Boyeria irene	*Diplacodes lefebvrii*	*Lindenia tetraphylla*	*Paragomphus genei*
Brachythemis impartita	*Enallagma deserti*	*Onychogomphus costae*	*Platycnemis subdilatata*
Calopteryx exul	*Erythromma lindenii*	*Onychogomphus forcipatus*	*Pyrrhosoma nymphula*
Calopteryx haemorrhoidalis	*Erythromma viridulum*	*Onychogomphus uncatus*	*Rhyothemis semihyalina*
Calopteryx virgo	*Gomphus lucasii*	*Orthetrum brunneum*	*Selysiothemis nigra*
Ceriagrion tenellum	*Ischnura fountaineae*	*Orthetrum cancellatum*	*Sympecma fusca*

FW502: Mediterranean Northwest Africa (*continued*)

Species	Species	Species	Species
Sympetrum fonscolombii	*Sympetrum sinaiticum*	*Trithemis arteriosa*	*Zygonyx torridus*
Sympetrum meridionale	*Sympetrum striolatum*	*Trithemis kirbyi*	
Sympetrum sanguineum	*Trithemis annulata*	*Urothemis edwardsii*	

FW503: Sahara (36 species, 1 278 records)

Species	Species	Species	Species
Acisoma inflatum	*Erythromma lindenii*	*Orthetrum chrysostigma*	*Platycnemis subdilatata*
Anax ephippiger	*Ischnura evansi*	*Orthetrum coerulescens*	*Pseudagrion hamoni*
Anax imperator	*Ischnura fountaineae*	*Orthetrum machadoi*	*Selysiothemis nigra*
Anax parthenope	*Ischnura graellsii*	*Orthetrum nitidinerve*	*Sympetrum fonscolombii*
Brachythemis impartita	*Ischnura saharensis*	*Orthetrum ransonnetii*	*Sympetrum sanguineum*
Calopteryx haemorrhoidalis	*Ischnura senegalensis*	*Orthetrum sabina*	*Sympetrum sinaiticum*
Coenagrion caerulescens	*Lestes barbarus*	*Orthetrum trinacria*	*Trithemis annulata*
Crocothemis erythraea	*Onychogomphus costae*	*Pantala flavescens*	*Trithemis arteriosa*
Diplacodes lefebvrii	*Orthetrum brunneum*	*Paragomphus genei*	*Trithemis kirbyi*

FW504: Dry Sahel (34 species, 594 records)

Species	Species	Species	Species
Agriocnemis sania	*Crocothemis sanguinolenta*	*Orthetrum icteromelas*	*Sympetrum fonscolombii*
Agriocnemis zerafica	*Diplacodes lefebvrii*	*Orthetrum ransonnetii*	*Sympetrum sinaiticum*
Anax ephippiger	*Ischnura evansi*	*Orthetrum sabina*	*Tramea limbata*
Anax imperator	*Ischnura fountaineae*	*Orthetrum trinacria*	*Trithemis annulata*
Anax parthenope	*Ischnura saharensis*	*Pantala flavescens*	*Trithemis arteriosa*
Brachythemis impartita	*Ischnura senegalensis*	*Paragomphus sinaiticus*	*Trithemis furva*
Brachythemis leucosticta	*Lestes pallidus*	*Pseudagrion hamoni*	*Trithemis kirbyi*
Ceriagrion glabrum	*Orthetrum brachiale*	*Pseudagrion torridum*	
Crocothemis erythraea	*Orthetrum chrysostigma*	*Sympecma fusca*	

FW505: Lower Niger – Benue (170 species, 1 359 records)

Species	Species	Species	Species
Aciagrion africanum	*Africallagma subtile*	*Allocnemis contraria*	*Anax rutherfordi*
Acisoma inflatum	*Africocypha centripunctata*	*Allocnemis elongata*	*Anax tristis*
Aethiothemis bequaerti	*Agriocnemis exilis*	*Allocnemis nigripes*	*Azuragrion buchholzi*
Aethiothemis incongruens	*Agriocnemis maclachlani*	*Anax congoliath*	*Azuragrion vansomereni*
Aethiothemis solitaria	*Agriocnemis victoria*	*Anax ephippiger*	*Brachythemis impartita*
Aethriamanta rezia	*Agriocnemis zerafica*	*Anax imperator*	*Brachythemis lacustris*

FW505: Lower Niger – Benue (*continued*)

Species	Species	Species	Species
Brachythemis leucosticta	*Hadrothemis versuta*	*Orthetrum microstigma*	*Pseudagrion sublacteum*
Brachythemis wilsoni	*Hemistigma albipunctum*	*Orthetrum monardi*	*Pseudagrion sudanicum*
Bradinopyga strachani	*Ictinogomphus ferox*	*Orthetrum stemmale*	*Pseudagrion torridum*
Ceriagrion bakeri	*Idomacromia proavita*	*Orthetrum trinacria*	*Rhyothemis fenestrina*
Ceriagrion corallinum	*Ischnura senegalensis*	*Oxythemis phoenicosceles*	*Rhyothemis notata*
Ceriagrion glabrum	*Lestes dissimulans*	*Palpopleura deceptor*	*Rhyothemis semihyalina*
Ceriagrion rubellocerinum	*Lestes pallidus*	*Palpopleura jucunda*	*Tetrathemis godiardi*
Ceriagrion suave	*Lestes pinheyi*	*Palpopleura lucia*	*Tetrathemis polleni*
Chalcostephia flavifrons	*Lestes plagiatus*	*Palpopleura portia*	*Thermochoria equivocata*
Chlorocypha cancellata	*Lestes tridens*	*Pantala flavescens*	*Tholymis tillarga*
Chlorocypha curta	*Lestes virgatus*	*Paragomphus genei*	*Tramea basilaris*
Chlorocypha cyanifrons	*Malgassophlebia bispina*	*Paragomphus serrulatus*	*Tramea limbata*
Chlorocypha radix	*Mesocnemis robusta*	*Parazyxomma flavicans*	*Trithemis aconita*
Chlorocypha rubida	*Mesocnemis singularis*	*Phaon iridipennis*	*Trithemis annulata*
Chlorocypha selysi	*Micromacromia camerunica*	*Phyllogomphus coloratus*	*Trithemis arteriosa*
Copera sikassoensis	*Neodythemis klingi*	*Phyllomacromia aeneothorax*	*Trithemis bredoi*
Crenigomphus renei	*Neophya rutherfordi*	*Phyllomacromia contumax*	*Trithemis dejouxi*
Crocothemis divisa	*Nesciothemis minor*	*Phyllomacromia hervei*	*Trithemis dichroa*
Crocothemis erythraea	*Nesciothemis nigeriensis*	*Phyllomacromia insignis*	*Trithemis furva*
Crocothemis sanguinolenta	*Nesciothemis pujoli*	*Phyllomacromia lieftincki*	*Trithemis grouti*
Diplacodes deminuta	*Neurogomphus featheri*	*Phyllomacromia picta*	*Trithemis hartwigi*
Diplacodes lefebvrii	*Neurolestes nigeriensis*	*Phyllomacromia sophia*	*Trithemis imitata*
Diplacodes luminans	*Notiothemis robertsi*	*Proischnura subfurcata*	*Trithemis kalula*
Elattoneura acuta	*Olpogastra lugubris*	*Pseudagrion camerunense*	*Trithemis kirbyi*
Elattoneura balli	*Orthetrum abbotti*	*Pseudagrion emarginatum*	*Trithemis pruinata*
Elattoneura lindleyi	*Orthetrum africanum*	*Pseudagrion gigas*	*Trithemis stictica*
Elattoneura nigra	*Orthetrum angustiventre*	*Pseudagrion glaucescens*	*Trithetrum navasi*
Elattoneura pruinosa	*Orthetrum austeni*	*Pseudagrion glaucoideum*	*Umma cincta*
Eleuthemis buettikoferi	*Orthetrum brachiale*	*Pseudagrion glaucum*	*Umma longistigma*
Gynacantha bullata	*Orthetrum caffrum*	*Pseudagrion hamoni*	*Umma mesostigma*
Gynacantha cylindrata	*Orthetrum camerunense*	*Pseudagrion kersteni*	*Urothemis assignata*
Gynacantha manderica	*Orthetrum chrysostigma*	*Pseudagrion kibalense*	*Urothemis edwardsii*
Gynacantha nigeriensis	*Orthetrum guineense*	*Pseudagrion malagasoides*	*Zygonyx flavicosta*
Gynacantha sextans	*Orthetrum hintzi*	*Pseudagrion melanicterum*	*Zygonyx natalensis*
Gynacantha vesiculata	*Orthetrum icteromelas*	*Pseudagrion nubicum*	*Zygonyx torridus*
Gynacantha villosa	*Orthetrum julia*	*Pseudagrion risi*	
Hadrothemis infesta	*Orthetrum latihami*	*Pseudagrion sjoestedti*	

FW506: Niger Delta (44 species, 164 records)

Species	Species	Species	Species
Acisoma trifidum	*Agriocnemis maclachlani*	*Bradinopyga strachani*	*Ceriagrion platystigma*
Aethriamanta rezia	*Agriocnemis zerafica*	*Ceriagrion glabrum*	*Ceriagrion tricrenaticeps*

FW506: Niger Delta (*continued*)

Species	Species	Species	Species
Chalcostephia flavifrons	*Hadrothemis infesta*	*Orthetrum stemmale*	*Tholymis tillarga*
Chlorocypha pyriformosa	*Hadrothemis versuta*	*Palpopleura lucia*	*Trithemis aenea*
Crocothemis erythraea	*Heliaeschna fuliginosa*	*Palpopleura portia*	*Trithemis grouti*
Cyanothemis simpsoni	*Hemistigma albipunctum*	*Pantala flavescens*	*Trithemis kirbyi*
Diplacodes lefebvrii	*Lestes dissimulans*	*Phaon iridipennis*	*Trithemis tropicana*
Elattoneura girardi	*Neodythemis preussi*	*Phyllomacromia hervei*	*Trithetrum navasi*
Eleuthemis buettikoferi	*Orthetrum austeni*	*Pseudagrion glaucum*	*Urothemis assignata*
Hadrothemis camarensis	*Orthetrum chrysostigma*	*Rhyothemis notata*	*Zygonyx torridus*
Hadrothemis coacta	*Orthetrum julia*	*Thermochoria equivocata*	*Zyxomma atlanticum*

FW507: Upper Niger (86 species, 270 records)

Species	Species	Species	Species
Aethriamanta rezia	*Diplacodes lefebvrii*	*Orthetrum trinacria*	*Pseudagrion torridum*
Africallagma subtile	*Diplacodes luminans*	*Palpopleura deceptor*	*Sapho bicolor*
Agriocnemis exilis	*Elattoneura balli*	*Palpopleura jucunda*	*Sapho ciliata*
Agriocnemis maclachlani	*Elattoneura nigra*	*Palpopleura lucia*	*Tetrathemis camerunensis*
Allocnemis elongata	*Elattoneura vittata*	*Palpopleura portia*	*Tholymis tillarga*
Allocnemis flavipennis	*Gynacantha bullata*	*Pantala flavescens*	*Tramea basilaris*
Anax ephippiger	*Gynacantha manderica*	*Paragomphus genei*	*Trithemis aconita*
Anax imperator	*Hemistigma albipunctum*	*Parazyxomma flavicans*	*Trithemis annulata*
Brachythemis impartita	*Ictinogomphus ferox*	*Phaon camerunensis*	*Trithemis arteriosa*
Brachythemis lacustris	*Ischnura senegalensis*	*Phaon iridipennis*	*Trithemis dejouxi*
Brachythemis leucosticta	*Lestes ictericus*	*Phyllomacromia aeneothorax*	*Trithemis dichroa*
Ceriagrion glabrum	*Lestes pallidus*	*Phyllomacromia contumax*	*Trithemis grouti*
Ceriagrion suave	*Mesocnemis singularis*	*Pseudagrion epiphonematicum*	*Trithemis imitata*
Chalcostephia flavifrons	*Olpogastra lugubris*	*Pseudagrion gigas*	*Trithemis kalula*
Chlorocypha curta	*Orthetrum abbotti*	*Pseudagrion glaucescens*	*Trithemis kirbyi*
Chlorocypha dispar	*Orthetrum angustiventre*	*Pseudagrion hamoni*	*Umma cincta*
Chlorocypha radix	*Orthetrum brachiale*	*Pseudagrion hemicolon*	*Urothemis assignata*
Chlorocypha selysi	*Orthetrum chrysostigma*	*Pseudagrion kersteni*	*Urothemis edwardsii*
Copera sikassoensis	*Orthetrum hintzi*	*Pseudagrion melanicterum*	*Zygonyx natalensis*
Crenigomphus renei	*Orthetrum julia*	*Pseudagrion nubicum*	*Zygonyx torridus*
Crocothemis erythraea	*Orthetrum microstigma*	*Pseudagrion sjoestedti*	
Crocothemis sanguinolenta	*Orthetrum stemmale*	*Pseudagrion sublacteum*	

FW508: Inner Niger Delta (19 species, 137 records)

Species	Species	Species	Species
Agriocnemis exilis	*Anax ephippiger*	*Bradinopyga strachani*	*Crocothemis erythraea*
Agriocnemis zerafica	*Brachythemis leucosticta*	*Ceriagrion glabrum*	*Crocothemis sanguinolenta*

FW508: Inner Niger Delta (*continued*)

Species	Species	Species	Species
Diplacodes lefebvrii	*Orthetrum chrysostigma*	*Pseudagrion hamoni*	*Trithemis hecate*
Ischnura senegalensis	*Orthetrum trinacria*	*Pseudagrion torridum*	*Urothemis edwardsii*
Lestes pallidus	*Pantala flavescens*	*Trithemis annulata*	

FW509: Senegal – Gambia (95 species, 2 205 records)

Species	Species	Species	Species
Acisoma inflatum	*Crocothemis erythraea*	*Orthetrum icteromelas*	*Rhyothemis notata*
Acisoma trifidum	*Crocothemis sanguinolenta*	*Orthetrum julia*	*Rhyothemis semihyalina*
Aethiothemis solitaria	*Diplacodes lefebvrii*	*Orthetrum microstigma*	*Sapho fumosa*
Aethriamanta rezia	*Diplacodes luminans*	*Orthetrum monardi*	*Sympetrum fonscolombii*
Africallagma subtile	*Elattoneura nigra*	*Orthetrum stemmale*	*Tetrathemis camerunensis*
Agriocnemis exilis	*Gynacantha manderica*	*Orthetrum trinacria*	*Tetrathemis polleni*
Agriocnemis maclachlani	*Hadrothemis defecta*	*Oxythemis phoenicosceles*	*Tholymis tillarga*
Agriocnemis victoria	*Heliaeschna fuliginosa*	*Palpopleura deceptor*	*Tramea basilaris*
Agriocnemis zerafica	*Hemistigma albipunctum*	*Palpopleura lucia*	*Tramea limbata*
Anax ephippiger	*Ischnura senegalensis*	*Palpopleura portia*	*Trithemis annulata*
Anax imperator	*Lestes dissimulans*	*Pantala flavescens*	*Trithemis arteriosa*
Anax tristis	*Lestes ictericus*	*Parazyxomma flavicans*	*Trithemis bifida*
Azuragrion vansomereni	*Lestes ochraceus*	*Phaon iridipennis*	*Trithemis grouti*
Brachythemis impartita	*Lestes pallidus*	*Phyllomacromia contumax*	*Trithemis hecate*
Brachythemis lacustris	*Mesocnemis robusta*	*Pseudagrion camerunense*	*Trithemis imitata*
Brachythemis leucosticta	*Neurogomphus featheri*	*Pseudagrion glaucescens*	*Trithemis kalula*
Bradinopyga strachani	*Olpogastra lugubris*	*Pseudagrion hamoni*	*Trithemis kirbyi*
Ceriagrion corallinum	*Orthetrum abbotti*	*Pseudagrion melanicterum*	*Trithemis pruinata*
Ceriagrion glabrum	*Orthetrum africanum*	*Pseudagrion nubicum*	*Trithetrum navasi*
Ceriagrion suave	*Orthetrum angustiventre*	*Pseudagrion sjoestedti*	*Urothemis assignata*
Chalcostephia flavifrons	*Orthetrum brachiale*	*Pseudagrion sublacteum*	*Urothemis edwardsii*
Chlorocypha dispar	*Orthetrum chrysostigma*	*Pseudagrion sudanicum*	*Zygonyx torridus*
Copera sikassoensis	*Orthetrum guineense*	*Pseudagrion torridum*	*Zyxomma atlanticum*
Crocothemis divisa	*Orthetrum hintzi*	*Rhyothemis fenestrina*	

FW510: Fouta – Djalon (7 species, 8 records)

Species	Species	Species	Species
Hadrothemis defecta	*Neodythemis klingi*	*Phaon iridipennis*	*Trithemis pruinata*
Hemistigma albipunctum	*Orthetrum julia*	*Thermochoria equivocata*	

FW511: Northern Upper Guinea (159 species, 1 590 records)

Species	Species	Species	Species
Acisoma inflatum	*Cyanothemis simpsoni*	*Notiothemis robertsi*	*Pseudagrion hemicolon*
Acisoma trifidum	*Diastatomma gamblesi*	*Olpogastra lugubris*	*Pseudagrion isidromorai*
Aethiothemis bella	*Diplacodes lefebvrii*	*Orthetrum abbotti*	*Pseudagrion kersteni*
Aethiothemis incongruens	*Diplacodes luminans*	*Orthetrum africanum*	*Pseudagrion malagasoides*
Aethiothemis solitaria	*Elattoneura balli*	*Orthetrum angustiventre*	*Pseudagrion melanicterum*
Aethriamanta rezia	*Elattoneura girardi*	*Orthetrum austeni*	*Pseudagrion sjoestedti*
Africallagma subtile	*Elattoneura nigra*	*Orthetrum brachiale*	*Pseudagrion sublacteum*
Agriocnemis angustirami	*Elattoneura villiersi*	*Orthetrum chrysostigma*	*Rhyothemis fenestrina*
Agriocnemis exilis	*Eleuthemis buettikoferi*	*Orthetrum guineense*	*Rhyothemis notata*
Agriocnemis maclachlani	*Gomphidia gamblesi*	*Orthetrum hintzi*	*Rhyothemis semihyalina*
Agriocnemis victoria	*Gynacantha africana*	*Orthetrum icteromelas*	*Sapho bicolor*
Agriocnemis zerafica	*Gynacantha bullata*	*Orthetrum julia*	*Sapho ciliata*
Allocnemis elongata	*Gynacantha cylindrata*	*Orthetrum latihami*	*Sapho fumosa*
Allocnemis flavipennis	*Gynacantha manderica*	*Orthetrum microstigma*	*Tetrathemis camerunensis*
Allocnemis subnodalis	*Gynacantha nigeriensis*	*Orthetrum monardi*	*Tetrathemis godiardi*
Anax chloromelas	*Gynacantha sextans*	*Orthetrum stemmale*	*Thermochoria equivocata*
Atoconeura luxata	*Gynacantha vesiculata*	*Oxythemis phoenicosceles*	*Tholymis tillarga*
Azuragrion vansomereni	*Gynacantha victoriae*	*Palpopleura deceptor*	*Tramea basilaris*
Brachythemis lacustris	*Hadrothemis camarensis*	*Palpopleura jucunda*	*Tramea limbata*
Bradinopyga strachani	*Hadrothemis coacta*	*Palpopleura lucia*	*Trithemis aconita*
Ceriagrion bakeri	*Hadrothemis defecta*	*Palpopleura portia*	*Trithemis africana*
Ceriagrion corallinum	*Hadrothemis infesta*	*Pantala flavescens*	*Trithemis annulata*
Ceriagrion glabrum	*Hadrothemis versuta*	*Paragomphus genei*	*Trithemis arteriosa*
Ceriagrion rubellocerinum	*Heliaeschna fuliginosa*	*Paragomphus kiautai*	*Trithemis basitincta*
Ceriagrion suave	*Hemistigma albipunctum*	*Paragomphus serrulatus*	*Trithemis bredoi*
Ceriagrion whellani	*Ictinogomphus ferox*	*Paragomphus tournieri*	*Trithemis dichroa*
Chalcostephia flavifrons	*Ictinogomphus fraseri*	*Parazyxomma flavicans*	*Trithemis grouti*
Chlorocypha curta	*Ischnura senegalensis*	*Phaon camerunensis*	*Trithemis hecate*
Chlorocypha dispar	*Lestinogomphus matilei*	*Phaon iridipennis*	*Trithemis imitata*
Chlorocypha luminosa	*Libyogomphus christinae*	*Phyllomacromia aeneothorax*	*Trithemis kalula*
Chlorocypha pyriformosa	*Malgassophlebia bispina*	*Phyllomacromia hervei*	*Trithemis stictica*
Chlorocypha radix	*Mesocnemis singularis*	*Phyllomacromia sophia*	*Trithetrum navasi*
Chlorocypha rubida	*Micromacromia camerunica*	*Porpax bipunctus*	*Umma cincta*
Chlorocypha selysi	*Micromacromia zygoptera*	*Pseudagrion camerunense*	*Urothemis assignata*
Copera guttifera	*Neodythemis campioni*	*Pseudagrion cyathiforme*	*Urothemis edwardsii*
Copera sikassoensis	*Neodythemis klingi*	*Pseudagrion epiphonematicum*	*Zygonyx chrysobaphes*
Crenigomphus renei	*Neophya rutherfordi*	*Pseudagrion gigas*	*Zygonyx flavicosta*
Crocothemis divisa	*Nesciothemis minor*	*Pseudagrion glaucescens*	*Zygonyx torridus*
Crocothemis erythraea	*Nesciothemis nigeriensis*	*Pseudagrion glaucum*	*Zyxomma atlanticum*
Crocothemis sanguinolenta	*Nesciothemis pujoli*	*Pseudagrion hamoni*	

FW512: Southern Upper Guinea (185 species, 4 226 records)

Species	Species	Species	Species
Aciagrion africanum	*Chlorocypha selysi*	*Mesocnemis tisi*	*Phyllomacromia contumax*
Aciagrion gracile	*Copera guttifera*	*Micromacromia camerunica*	*Phyllomacromia hervei*
Acisoma inflatum	*Copera sikassoensis*	*Micromacromia zygoptera*	*Phyllomacromia lamottei*
Acisoma trifidum	*Cornigomphus mariannae*	*Neodythemis campioni*	*Phyllomacromia melania*
Aethiothemis bella	*Crocothemis divisa*	*Neodythemis klingi*	*Phyllomacromia occidentalis*
Aethiothemis incongruens	*Crocothemis erythraea*	*Neophya rutherfordi*	*Phyllomacromia sophia*
Aethiothemis mediofasciata	*Crocothemis sanguinolenta*	*Nesciothemis minor*	*Porpax bipunctus*
Aethiothemis solitaria	*Cyanothemis simpsoni*	*Nesciothemis nigeriensis*	*Pseudagrion camerunense*
Aethriamanta rezia	*Diastatomma gamblesi*	*Nesciothemis pujoli*	*Pseudagrion cyathiforme*
Africallagma subtile	*Diplacodes deminuta*	*Notiothemis robertsi*	*Pseudagrion epiphonematicum*
Agriocnemis angustirami	*Diplacodes lefebvrii*	*Olpogastra lugubris*	*Pseudagrion glaucescens*
Agriocnemis exilis	*Diplacodes luminans*	*Orthetrum abbotti*	*Pseudagrion glaucoideum*
Agriocnemis maclachlani	*Elattoneura balli*	*Orthetrum africanum*	*Pseudagrion glaucum*
Agriocnemis victoria	*Elattoneura girardi*	*Orthetrum angustiventre*	*Pseudagrion hamoni*
Agriocnemis zerafica	*Elattoneura nigra*	*Orthetrum austeni*	*Pseudagrion hemicolon*
Allocnemis elongata	*Elattoneura villiersi*	*Orthetrum brachiale*	*Pseudagrion isidromorai*
Allocnemis flavipennis	*Eleuthemis buettikoferi*	*Orthetrum chrysostigma*	*Pseudagrion kersteni*
Allocnemis subnodalis	*Gomphidia gamblesi*	*Orthetrum guineense*	*Pseudagrion malagasoides*
Anax chloromelas	*Gynacantha africana*	*Orthetrum hintzi*	*Pseudagrion melanicterum*
Anax imperator	*Gynacantha bullata*	*Orthetrum icteromelas*	*Pseudagrion nubicum*
Anax rutherfordi	*Gynacantha cylindrata*	*Orthetrum julia*	*Pseudagrion sjoestedti*
Anax tristis	*Gynacantha nigeriensis*	*Orthetrum latihami*	*Pseudagrion sublacteum*
Atoconeura luxata	*Gynacantha sextans*	*Orthetrum microstigma*	*Rhyothemis fenestrina*
Azuragrion vansomereni	*Gynacantha vesiculata*	*Orthetrum monardi*	*Rhyothemis notata*
Brachythemis impartita	*Hadrothemis camarensis*	*Orthetrum saegeri*	*Rhyothemis semihyalina*
Brachythemis lacustris	*Hadrothemis coacta*	*Orthetrum stemmale*	*Sapho bicolor*
Bradinopyga strachani	*Hadrothemis defecta*	*Orthetrum trinacria*	*Sapho ciliata*
Ceriagrion bakeri	*Hadrothemis infesta*	*Oxythemis phoenicosceles*	*Sapho fumosa*
Ceriagrion corallinum	*Hadrothemis versuta*	*Palpopleura deceptor*	*Tetrathemis camerunensis*
Ceriagrion glabrum	*Heliaeschna fuliginosa*	*Palpopleura lucia*	*Tetrathemis godiardi*
Ceriagrion rubellocerinum	*Heliaeschna sembe*	*Palpopleura portia*	*Tetrathemis polleni*
Ceriagrion suave	*Hemistigma albipunctum*	*Pantala flavescens*	*Thermochoria equivocata*
Ceriagrion tricrenaticeps	*Ictinogomphus ferox*	*Paragomphus genei*	*Tholymis tillarga*
Ceriagrion whellani	*Ictinogomphus fraseri*	*Paragomphus kiautai*	*Tramea basilaris*
Chalcostephia flavifrons	*Idomacromia proavita*	*Paragomphus nigroviridis*	*Tramea limbata*
Chlorocypha curta	*Ischnura senegalensis*	*Paragomphus serrulatus*	*Trithemis aconita*
Chlorocypha cyanifrons	*Lestes dissimulans*	*Paragomphus tournieri*	*Trithemis aenea*
Chlorocypha dispar	*Lestes tridens*	*Parazyxomma flavicans*	*Trithemis africana*
Chlorocypha luminosa	*Lestinogomphus matilei*	*Phaon camerunensis*	*Trithemis annulata*
Chlorocypha pyriformosa	*Libyogomphus christinae*	*Phaon iridipennis*	*Trithemis arteriosa*
Chlorocypha radix	*Malgassophlebia bispina*	*Phyllogomphus moundi*	*Trithemis basitincta*
Chlorocypha rubida	*Mesocnemis singularis*	*Phyllomacromia aeneothorax*	*Trithemis dejouxi*

FW512: Southern Upper Guinea (*continued*)

Species	Species	Species	Species
Trithemis dichroa	*Trithemis kirbyi*	*Urothemis edwardsii*	*Zygonyx torridus*
Trithemis grouti	*Trithemis stictica*	*Zygonyx chrysobaphes*	*Zyxomma atlanticum*
Trithemis hecate	*Trithetrum navasi*	*Zygonyx flavicosta*	
Trithemis imitata	*Umma cincta*	*Zygonyx geminuncus*	
Trithemis kalula	*Urothemis assignata*	*Zygonyx natalensis*	

FW513: Mount Nimba (97 species, 344 records)

Species	Species	Species	Species
Aciagrion africanum	*Cyanothemis simpsoni*	*Nesciothemis minor*	*Phyllomacromia sophia*
Aciagrion gracile	*Diastatomma gamblesi*	*Nesciothemis pujoli*	*Pseudagrion epiphonematicum*
Acisoma trifidum	*Diplacodes lefebvrii*	*Notiothemis robertsi*	*Pseudagrion gigas*
Aethriamanta rezia	*Elattoneura balli*	*Olpogastra lugubris*	*Pseudagrion melanicterum*
Allocnemis elongata	*Elattoneura girardi*	*Orthetrum abbotti*	*Sapho bicolor*
Allocnemis flavipennis	*Elattoneura nigra*	*Orthetrum africanum*	*Sapho ciliata*
Allocnemis subnodalis	*Elattoneura villiersi*	*Orthetrum austeni*	*Sapho fumosa*
Anax imperator	*Gomphidia gamblesi*	*Orthetrum brachiale*	*Tetrathemis camerunensis*
Anax tristis	*Gynacantha bullata*	*Orthetrum guineense*	*Tetrathemis godiardi*
Atoconeura luxata	*Gynacantha sextans*	*Orthetrum hintzi*	*Thermochoria equivocata*
Ceriagrion glabrum	*Gynacantha vesiculata*	*Orthetrum julia*	*Tholymis tillarga*
Ceriagrion rubellocerinum	*Hadrothemis camarensis*	*Orthetrum latihami*	*Trithemis arteriosa*
Ceriagrion suave	*Hadrothemis defecta*	*Orthetrum microstigma*	*Trithemis dichroa*
Ceriagrion whellani	*Hadrothemis infesta*	*Orthetrum stemmale*	*Trithemis grouti*
Chalcostephia flavifrons	*Hadrothemis versuta*	*Palpopleura lucia*	*Trithemis kalula*
Chlorocypha curta	*Hemistigma albipunctum*	*Palpopleura portia*	*Trithemis pruinata*
Chlorocypha dispar	*Idomacromia proavita*	*Pantala flavescens*	*Umma cincta*
Chlorocypha luminosa	*Lestes dissimulans*	*Paragomphus kiautai*	*Urothemis assignata*
Chlorocypha radix	*Libyogomphus christinae*	*Paragomphus tournieri*	*Zygonyx chrysobaphes*
Chlorocypha selysi	*Malgassophlebia bispina*	*Phaon camerunensis*	*Zygonyx flavicosta*
Copera sikassoensis	*Mesocnemis singularis*	*Phaon iridipennis*	*Zygonyx geminuncus*
Cornigomphus mariannae	*Micromacromia zygoptera*	*Phyllogomphus moundi*	*Zygonyx torridus*
Crocothemis divisa	*Neodythemis campioni*	*Phyllomacromia aeneothorax*	
Crocothemis erythraea	*Neodythemis klingi*	*Phyllomacromia lamottei*	
Crocothemis sanguinolenta	*Neophya rutherfordi*	*Phyllomacromia melania*	

FW514: Eburneo (138 species, 584 records)

Species	Species	Species	Species
Aciagrion africanum	*Acisoma trifidum*	*Agriocnemis maclachlani*	*Allocnemis elongata*
Aciagrion gracile	*Aethriamanta rezia*	*Agriocnemis victoria*	*Allocnemis subnodalis*
Acisoma inflatum	*Agriocnemis exilis*	*Agriocnemis zerafica*	*Anax ephippiger*

FW514: Eburneo (*continued*)

Species	Species	Species	Species
Anax tristis	*Gynacantha bullata*	*Orthetrum julia*	*Pseudagrion torridum*
Azuragrion vansomereni	*Gynacantha cylindrata*	*Orthetrum latihami*	*Rhyothemis fenestrina*
Brachythemis lacustris	*Gynacantha manderica*	*Orthetrum microstigma*	*Rhyothemis semihyalina*
Brachythemis leucosticta	*Gynacantha sextans*	*Orthetrum monardi*	*Sapho ciliata*
Brachythemis wilsoni	*Hadrothemis camarensis*	*Orthetrum stemmale*	*Tetrathemis camerunensis*
Bradinopyga strachani	*Hadrothemis defecta*	*Orthetrum trinacria*	*Tetrathemis polleni*
Ceriagrion bakeri	*Hadrothemis infesta*	*Oxythemis phoenicosceles*	*Thermochoria equivocata*
Ceriagrion corallinum	*Hadrothemis versuta*	*Palpopleura deceptor*	*Tholymis tillarga*
Ceriagrion glabrum	*Hemistigma albipunctum*	*Palpopleura jucunda*	*Tramea basilaris*
Ceriagrion rubellocerinum	*Ictinogomphus ferox*	*Palpopleura lucia*	*Tramea limbata*
Ceriagrion suave	*Ictinogomphus fraseri*	*Palpopleura portia*	*Trithemis aconita*
Ceriagrion whellani	*Lestes dissimulans*	*Pantala flavescens*	*Trithemis aenea*
Chalcostephia flavifrons	*Lestes ictericus*	*Paragomphus genei*	*Trithemis africana*
Chlorocypha curta	*Lestes ochraceus*	*Paragomphus serrulatus*	*Trithemis annulata*
Chlorocypha dispar	*Lestes pallidus*	*Parazyxomma flavicans*	*Trithemis arteriosa*
Chlorocypha pyriformosa	*Lestes tridens*	*Phaon iridipennis*	*Trithemis bredoi*
Chlorocypha rubida	*Mesocnemis singularis*	*Phyllogomphus aethiops*	*Trithemis dejouxi*
Copera guttifera	*Micromacromia zygoptera*	*Phyllomacromia contumax*	*Trithemis dichroa*
Copera sikassoensis	*Neodythemis klingi*	*Phyllomacromia hervei*	*Trithemis grouti*
Crenigomphus renei	*Neophya rutherfordi*	*Phyllomacromia melania*	*Trithemis imitata*
Crocothemis divisa	*Nesciothemis minor*	*Pseudagrion camerunense*	*Trithemis kalula*
Crocothemis erythraea	*Nesciothemis pujoli*	*Pseudagrion gigas*	*Trithemis kirbyi*
Crocothemis sanguinolenta	*Olpogastra lugubris*	*Pseudagrion glaucescens*	*Trithetrum navasi*
Cyanothemis simpsoni	*Orthetrum abbotti*	*Pseudagrion glaucum*	*Urothemis assignata*
Diplacodes lefebvrii	*Orthetrum africanum*	*Pseudagrion hamoni*	*Urothemis edwardsii*
Diplacodes luminans	*Orthetrum angustiventre*	*Pseudagrion hemicolon*	*Zygonoides fraseri*
Elattoneura girardi	*Orthetrum austeni*	*Pseudagrion kersteni*	*Zygonyx flavicosta*
Elattoneura glauca	*Orthetrum brachiale*	*Pseudagrion malagasoides*	*Zygonyx natalensis*
Elattoneura nigra	*Orthetrum chrysostigma*	*Pseudagrion melanicterum*	*Zygonyx torridus*
Elattoneura villiersi	*Orthetrum guineense*	*Pseudagrion nubicum*	*Zyxomma atlanticum*
Gomphidia bredoi	*Orthetrum hintzi*	*Pseudagrion sjoestedti*	
Gynacantha africana	*Orthetrum icteromelas*	*Pseudagrion sublacteum*	

FW515: Ashanti (131 species, 899 records)

Species	Species	Species	Species
Acisoma inflatum	*Agriocnemis zerafica*	*Anax imperator*	*Bradinopyga strachani*
Acisoma trifidum	*Allocnemis elongata*	*Anax tristis*	*Ceriagrion corallinum*
Aethriamanta rezia	*Allocnemis flavipennis*	*Atoconeura luxata*	*Ceriagrion glabrum*
Africallagma vaginale	*Allocnemis subnodalis*	*Azuragrion vansomereni*	*Ceriagrion rubellocerinum*
Agriocnemis maclachlani	*Anax ephippiger*	*Brachythemis leucosticta*	*Chalcostephia flavifrons*

FW515: Ashanti (*continued*)

Species	Species	Species	Species
Chlorocypha curta	*Hadrothemis camarensis*	*Orthetrum stemmale*	*Pseudagrion sjoestedti*
Chlorocypha dispar	*Hadrothemis coacta*	*Orthetrum trinacria*	*Pseudagrion sublacteum*
Chlorocypha luminosa	*Hadrothemis defecta*	*Oxythemis phoenicosceles*	*Pseudagrion torridum*
Chlorocypha pyriformosa	*Hadrothemis infesta*	*Palpopleura deceptor*	*Rhyothemis fenestrina*
Chlorocypha radix	*Hadrothemis versuta*	*Palpopleura lucia*	*Rhyothemis notata*
Chlorocypha rubida	*Heliaeschna fuliginosa*	*Palpopleura portia*	*Rhyothemis semihyalina*
Chlorocypha selysi	*Hemistigma albipunctum*	*Pantala flavescens*	*Sapho bicolor*
Copera guttifera	*Ictinogomphus ferox*	*Paragomphus genei*	*Sapho ciliata*
Copera sikassoensis	*Ictinogomphus fraseri*	*Paragomphus nigroviridis*	*Tetrathemis camerunensis*
Crocothemis divisa	*Ischnura senegalensis*	*Paragomphus serrulatus*	*Tetrathemis godiardi*
Crocothemis erythraea	*Lestes dissimulans*	*Parazyxomma flavicans*	*Thermochoria equivocata*
Crocothemis sanguinolenta	*Mesocnemis robusta*	*Phaon camerunensis*	*Tholymis tillarga*
Cyanothemis simpsoni	*Mesocnemis singularis*	*Phaon iridipennis*	*Tramea basilaris*
Diastatomma gamblesi	*Micromacromia zygoptera*	*Phyllogomphus aethiops*	*Tramea limbata*
Diplacodes lefebvrii	*Neodythemis klingi*	*Phyllogomphus moundi*	*Trithemis aconita*
Diplacodes luminans	*Neophya rutherfordi*	*Phyllomacromia melania*	*Trithemis annulata*
Elattoneura balli	*Nesciothemis minor*	*Phyllomacromia sophia*	*Trithemis arteriosa*
Elattoneura girardi	*Nesciothemis pujoli*	*Pseudagrion camerunense*	*Trithemis basitincta*
Elattoneura nigra	*Notiothemis robertsi*	*Pseudagrion epiphonematicum*	*Trithemis dichroa*
Elattoneura villiersi	*Olpogastra lugubris*	*Pseudagrion glaucescens*	*Trithemis grouti*
Eleuthemis buettikoferi	*Orthetrum africanum*	*Pseudagrion glaucoideum*	*Trithetrum navasi*
Gomphidia gamblesi	*Orthetrum austeni*	*Pseudagrion glaucum*	*Umma cincta*
Gynacantha africana	*Orthetrum brachiale*	*Pseudagrion hamoni*	*Urothemis assignata*
Gynacantha bullata	*Orthetrum chrysostigma*	*Pseudagrion hemicolon*	*Urothemis edwardsii*
Gynacantha cylindrata	*Orthetrum hintzi*	*Pseudagrion kersteni*	*Zygonyx chrysobaphes*
Gynacantha manderica	*Orthetrum julia*	*Pseudagrion malagasoides*	*Zygonyx flavicosta*
Gynacantha sextans	*Orthetrum microstigma*	*Pseudagrion melanicterum*	*Zygonyx torridus*
Gynacantha vesiculata	*Orthetrum saegeri*	*Pseudagrion nubicum*	

FW516: Volta (143 species, 1 342 records)

Species	Species	Species	Species
Aciagrion gracile	*Allocnemis flavipennis*	*Brachythemis wilsoni*	*Chlorocypha dispar*
Acisoma inflatum	*Allocnemis subnodalis*	*Bradinopyga strachani*	*Chlorocypha luminosa*
Acisoma trifidum	*Anax ephippiger*	*Ceriagrion bakeri*	*Chlorocypha pyriformosa*
Aethiothemis incongruens	*Anax imperator*	*Ceriagrion glabrum*	*Chlorocypha radix*
Aethriamanta rezia	*Anax tristis*	*Ceriagrion ignitum*	*Chlorocypha selysi*
Agriocnemis exilis	*Azuragrion vansomereni*	*Ceriagrion rubellocerinum*	*Copera sikassoensis*
Agriocnemis maclachlani	*Brachythemis impartita*	*Ceriagrion suave*	*Crenigomphus renei*
Agriocnemis zerafica	*Brachythemis lacustris*	*Chalcostephia flavifrons*	*Crocothemis divisa*
Allocnemis elongata	*Brachythemis leucosticta*	*Chlorocypha curta*	*Crocothemis erythraea*

FW516: Volta (*continued*)

Species	Species	Species	Species
Crocothemis sanguinolenta	*Lestes pinheyi*	*Paragomphus genei*	*Tramea limbata*
Cyanothemis simpsoni	*Lestinogomphus matilei*	*Paragomphus serrulatus*	*Trithemis aconita*
Diastatomma bicolor	*Mesocnemis robusta*	*Parazyxomma flavicans*	*Trithemis annulata*
Diastatomma gamblesi	*Mesocnemis singularis*	*Phaon iridipennis*	*Trithemis arteriosa*
Diplacodes lefebvrii	*Neodythemis klingi*	*Phyllogomphus aethiops*	*Trithemis basitincta*
Diplacodes luminans	*Nesciothemis minor*	*Phyllogomphus moundi*	*Trithemis bifida*
Elattoneura balli	*Nesciothemis pujoli*	*Phyllomacromia contumax*	*Trithemis bredoi*
Elattoneura glauca	*Neurogomphus fuscifrons*	*Phyllomacromia hervei*	*Trithemis dejouxi*
Elattoneura nigra	*Notiothemis robertsi*	*Pseudagrion emarginatum*	*Trithemis dichroa*
Eleuthemis buettikoferi	*Olpogastra lugubris*	*Pseudagrion gigas*	*Trithemis grouti*
Gomphidia bredoi	*Orthetrum abbotti*	*Pseudagrion glaucescens*	*Trithemis hecate*
Gomphidia gamblesi	*Orthetrum angustiventre*	*Pseudagrion glaucoideum*	*Trithemis imitata*
Gynacantha bullata	*Orthetrum austeni*	*Pseudagrion hamoni*	*Trithemis kalula*
Gynacantha cylindrata	*Orthetrum brachiale*	*Pseudagrion kersteni*	*Trithemis kirbyi*
Gynacantha manderica	*Orthetrum chrysostigma*	*Pseudagrion melanicterum*	*Trithemis pruinata*
Gynacantha nigeriensis	*Orthetrum guineense*	*Pseudagrion nubicum*	*Trithemis stictica*
Gynacantha sextans	*Orthetrum hintzi*	*Pseudagrion sjoestedti*	*Trithetrum navasi*
Gynacantha vesiculata	*Orthetrum icteromelas*	*Pseudagrion sublacteum*	*Umma cincta*
Hadrothemis camarensis	*Orthetrum julia*	*Pseudagrion sudanicum*	*Urothemis assignata*
Hadrothemis coacta	*Orthetrum microstigma*	*Pseudagrion torridum*	*Urothemis edwardsii*
Hemistigma albipunctum	*Orthetrum monardi*	*Rhyothemis semihyalina*	*Zygonoides fraseri*
Ictinogomphus ferox	*Orthetrum stemmale*	*Sapho bicolor*	*Zygonyx chrysobaphes*
Ictinogomphus fraseri	*Orthetrum trinacria*	*Sapho ciliata*	*Zygonyx flavicosta*
Ischnura senegalensis	*Palpopleura deceptor*	*Tetrathemis camerunensis*	*Zygonyx geminuncus*
Lestes dissimulans	*Palpopleura lucia*	*Tetrathemis polleni*	*Zygonyx natalensis*
Lestes ochraceus	*Palpopleura portia*	*Tholymis tillarga*	*Zygonyx torridus*
Lestes pallidus	*Pantala flavescens*	*Tramea basilaris*	

FW517: Bight Drainages (140 species, 1 456 records)

Species	Species	Species	Species
Aciagrion gracile	*Allocnemis elongata*	*Ceriagrion bakeri*	*Chlorocypha radix*
Acisoma inflatum	*Allocnemis flavipennis*	*Ceriagrion corallinum*	*Chlorocypha rubida*
Acisoma trifidum	*Allocnemis subnodalis*	*Ceriagrion glabrum*	*Chlorocypha selysi*
Aethiothemis incongruens	*Anax ephippiger*	*Ceriagrion rubellocerinum*	*Copera guttifera*
Aethiothemis solitaria	*Anax imperator*	*Ceriagrion suave*	*Copera sikassoensis*
Aethriamanta rezia	*Anax tristis*	*Chalcostephia flavifrons*	*Crocothemis divisa*
Africallagma subtile	*Azuragrion vansomereni*	*Chlorocypha curta*	*Crocothemis erythraea*
Agriocnemis exilis	*Brachythemis lacustris*	*Chlorocypha dispar*	*Crocothemis sanguinolenta*
Agriocnemis maclachlani	*Brachythemis leucosticta*	*Chlorocypha luminosa*	*Cyanothemis simpsoni*
Agriocnemis zerafica	*Bradinopyga strachani*	*Chlorocypha pyriformosa*	*Diastatomma gamblesi*

FW517: Bight Drainages (*continued*)

Species	Species	Species	Species
Diplacodes deminuta	*Mesocnemis singularis*	*Parazyxomma flavicans*	*Sapho ciliata*
Diplacodes lefebvrii	*Neodythemis klingi*	*Phaon camerunensis*	*Tetrathemis camerunensis*
Diplacodes luminans	*Nesciothemis minor*	*Phaon iridipennis*	*Thermochoria equivocata*
Elattoneura balli	*Nesciothemis pujoli*	*Phyllogomphus moundi*	*Tholymis tillarga*
Elattoneura nigra	*Olpogastra lugubris*	*Phyllomacromia contumax*	*Tramea basilaris*
Eleuthemis buettikoferi	*Orthetrum abbotti*	*Phyllomacromia hervei*	*Trithemis aconita*
Gomphidia gamblesi	*Orthetrum africanum*	*Phyllomacromia melania*	*Trithemis annulata*
Gynacantha bullata	*Orthetrum angustiventre*	*Phyllomacromia sophia*	*Trithemis arteriosa*
Gynacantha cylindrata	*Orthetrum austeni*	*Pseudagrion camerunense*	*Trithemis bredoi*
Gynacantha manderica	*Orthetrum brachiale*	*Pseudagrion gigas*	*Trithemis dejouxi*
Gynacantha nigeriensis	*Orthetrum chrysostigma*	*Pseudagrion glaucescens*	*Trithemis dichroa*
Gynacantha sextans	*Orthetrum guineense*	*Pseudagrion glaucoideum*	*Trithemis grouti*
Hadrothemis defecta	*Orthetrum hintzi*	*Pseudagrion glaucum*	*Trithemis imitata*
Hadrothemis infesta	*Orthetrum icteromelas*	*Pseudagrion hamoni*	*Trithemis kalula*
Hadrothemis versuta	*Orthetrum julia*	*Pseudagrion hemicolon*	*Trithemis kirbyi*
Heliaeschna sembe	*Orthetrum microstigma*	*Pseudagrion isidromorai*	*Trithemis pruinata*
Hemistigma albipunctum	*Orthetrum stemmale*	*Pseudagrion kersteni*	*Trithetrum navasi*
Ictinogomphus ferox	*Orthetrum trinacria*	*Pseudagrion melanicterum*	*Umma cincta*
Ischnura senegalensis	*Oxythemis phoenicosceles*	*Pseudagrion nubicum*	*Umma longistigma*
Lestes dissimulans	*Palpopleura deceptor*	*Pseudagrion sjoestedti*	*Urothemis assignata*
Lestes ictericus	*Palpopleura lucia*	*Pseudagrion sublacteum*	*Urothemis edwardsii*
Lestes ochraceus	*Palpopleura portia*	*Rhyothemis fenestrina*	*Zygonyx chrysobaphes*
Lestes tridens	*Pantala flavescens*	*Rhyothemis notata*	*Zygonyx flavicosta*
Lestinogomphus matilei	*Paragomphus genei*	*Rhyothemis semihyalina*	*Zygonyx torridus*
Mesocnemis robusta	*Paragomphus serrulatus*	*Sapho bicolor*	*Zyxomma atlanticum*

FW518: Northern Gulf of Guinea Drainages (150 species, 890 records)

Species	Species	Species	Species
Aciagrion africanum	*Allocnemis nigripes*	*Chlorocypha curta*	*Diastatomma bicolor*
Aciagrion gracile	*Allocnemis subnodalis*	*Chlorocypha cyanifrons*	*Diastatomma tricolor*
Acisoma inflatum	*Anax chloromelas*	*Chlorocypha glauca*	*Diplacodes lefebvrii*
Acisoma trifidum	*Anax congoliath*	*Chlorocypha neptunus*	*Elattoneura acuta*
Aethiothemis incongruens	*Anax ephippiger*	*Chlorocypha pyriformosa*	*Elattoneura balli*
Africocypha centripunctata	*Anax imperator*	*Chlorocypha rubida*	*Elattoneura nigra*
Africocypha lacuselephantum	*Anax tristis*	*Chlorocypha selysi*	*Elattoneura pruinosa*
Agriocnemis maclachlani	*Atoconeura luxata*	*Copera sikassoensis*	*Elattoneura vittata*
Agriocnemis zerafica	*Azuragrion buchholzi*	*Crocothemis divisa*	*Eleuthemis buettikoferi*
Allocnemis contraria	*Ceriagrion glabrum*	*Crocothemis erythraea*	*Gynacantha africana*
Allocnemis cyanura	*Chalcostephia flavifrons*	*Crocothemis sanguinolenta*	*Gynacantha bullata*
Allocnemis flavipennis	*Chlorocypha cancellata*	*Cyanothemis simpsoni*	*Gynacantha cylindrata*

FW518: Northern Gulf of Guinea Drainages (*continued*)

Species	Species	Species	Species
Gynacantha nigeriensis	*Nubiolestes diotima*	*Phyllogomphus selysi*	*Sapho puella*
Gynacantha sextans	*Olpogastra lugubris*	*Phyllomacromia bicristulata*	*Stenocnemis pachystigma*
Hadrothemis camarensis	*Orthetrum abbotti*	*Phyllomacromia caneri*	*Stenocypha gracilis*
Hadrothemis coacta	*Orthetrum africanum*	*Phyllomacromia contumax*	*Tetrathemis camerunensis*
Hadrothemis defecta	*Orthetrum austeni*	*Phyllomacromia funicularioides*	*Thermochoria equivocata*
Hadrothemis infesta	*Orthetrum brachiale*	*Phyllomacromia hervei*	*Tholymis tillarga*
Hadrothemis versuta	*Orthetrum camerunense*	*Phyllomacromia lieftincki*	*Tramea basilaris*
Heliaeschna fuliginosa	*Orthetrum chrysostigma*	*Phyllomacromia melania*	*Trithemis aconita*
Hemistigma albipunctum	*Orthetrum guineense*	*Phyllomacromia paula*	*Trithemis annulata*
Idomacromia proavita	*Orthetrum julia*	*Phyllomacromia sophia*	*Trithemis arteriosa*
Ischnura senegalensis	*Orthetrum microstigma*	*Platycypha rufitibia*	*Trithemis basitincta*
Libyogomphus mamfei	*Orthetrum monardi*	*Porpax asperipes*	*Trithemis dichroa*
Malgassophlebia bispina	*Orthetrum saegeri*	*Porpax bipunctus*	*Trithemis grouti*
Mesocnemis singularis	*Orthetrum stemmale*	*Pseudagrion camerunense*	*Trithemis kalula*
Micromacromia camerunica	*Orthetrum trinacria*	*Pseudagrion epiphonematicum*	*Trithemis osvaldae*
Micromacromia zygoptera	*Oxythemis phoenicosceles*	*Pseudagrion glaucescens*	*Trithemis pruinata*
Neodythemis afra	*Palpopleura deceptor*	*Pseudagrion hamoni*	*Umma longistigma*
Neodythemis klingi	*Palpopleura lucia*	*Pseudagrion hemicolon*	*Umma mesostigma*
Neodythemis preussi	*Palpopleura portia*	*Pseudagrion kersteni*	*Umma mesumbei*
Neodythemis takamandensis	*Pantala flavescens*	*Pseudagrion melanicterum*	*Urothemis assignata*
Nesciothemis minor	*Paragomphus abnormis*	*Pseudagrion risi*	*Zygonyx flavicosta*
Neurolestes nigeriensis	*Paragomphus genei*	*Pseudagrion serrulatum*	*Zygonyx natalensis*
Neurolestes trinervis	*Parazyxomma flavicans*	*Pseudagrion sjoestedti*	*Zygonyx speciosus*
Notiothemis robertsi	*Pentaphlebia stahli*	*Rhyothemis notata*	*Zyxomma atlanticum*
Notogomphus moorei	*Phaon camerunensis*	*Sapho bicolor*	
Notogomphus spinosus	*Phaon iridipennis*	*Sapho orichalcea*	

FW519: Western Equatorial Crater Lakes (136 species, 1 386 records)

Species	Species	Species	Species
Acisoma trifidum	*Anax imperator*	*Chlorocypha cyanifrons*	*Elattoneura balli*
Aethiothemis incongruens	*Anax tristis*	*Chlorocypha glauca*	*Elattoneura nigra*
Africocypha centripunctata	*Atoconeura luxata*	*Chlorocypha neptunus*	*Elattoneura pruinosa*
Africocypha lacuselephantum	*Azuragrion buchholzi*	*Chlorocypha rubida*	*Elattoneura vittata*
Afroaeschna scotias	*Azuragrion vansomereni*	*Chlorocypha selysi*	*Gomphidia gamblesi*
Agriocnemis maclachlani	*Bradinopyga strachani*	*Chlorocypha victoriae*	*Gynacantha bullata*
Agriocnemis zerafica	*Ceriagrion glabrum*	*Crocothemis erythraea*	*Gynacantha sextans*
Allocnemis contraria	*Ceriagrion rubellocerinum*	*Crocothemis sanguinolenta*	*Hadrothemis camarensis*
Allocnemis nigripes	*Chalcostephia flavifrons*	*Cyanothemis simpsoni*	*Hadrothemis coacta*
Anax chloromelas	*Chlorocypha cancellata*	*Diastatomma bicolor*	*Hadrothemis defecta*
Anax congoliath	*Chlorocypha curta*	*Diastatomma tricolor*	*Hadrothemis infesta*

FW519: Western Equatorial Crater Lakes (*continued*)

Species	Species	Species	Species
Hadrothemis versuta	*Orthetrum camerunense*	*Phyllomacromia melania*	*Thermochoria equivocata*
Heliaeschna cynthiae	*Orthetrum chrysostigma*	*Phyllomacromia sophia*	*Tholymis tillarga*
Heliaeschna fuliginosa	*Orthetrum guineense*	*Platycypha lacustris*	*Tramea basilaris*
Ictinogomphus fraseri	*Orthetrum julia*	*Platycypha rufitibia*	*Trithemis aconita*
Idomacromia proavita	*Orthetrum microstigma*	*Porpax asperipes*	*Trithemis annulata*
Ischnura senegalensis	*Orthetrum stemmale*	*Porpax bipunctus*	*Trithemis arteriosa*
Libyogomphus tenaculatus	*Orthetrum trinacria*	*Pseudagrion camerunense*	*Trithemis basitincta*
Mesocnemis singularis	*Oxythemis phoenicosceles*	*Pseudagrion epiphonematicum*	*Trithemis dichroa*
Micromacromia camerunica	*Palpopleura deceptor*	*Pseudagrion hemicolon*	*Trithemis furva*
Neodythemis afra	*Palpopleura lucia*	*Pseudagrion kersteni*	*Trithemis grouti*
Neodythemis klingi	*Palpopleura portia*	*Pseudagrion melanicterum*	*Trithemis hartwigi*
Neodythemis preussi	*Pantala flavescens*	*Pseudagrion nubicum*	*Trithemis nuptialis*
Neurogomphus fuscifrons	*Paragomphus abnormis*	*Pseudagrion risi*	*Trithemis pruinata*
Neurolestes trinervis	*Paragomphus nigroviridis*	*Pseudagrion sjoestedti*	*Trithemis tropicana*
Notiothemis robertsi	*Pentaphlebia stahli*	*Pseudagrion sublacteum*	*Umma longistigma*
Notogomphus maryae	*Phaon camerunensis*	*Sapho bicolor*	*Umma mesostigma*
Notogomphus moorei	*Phaon iridipennis*	*Sapho gloriosa*	*Umma mesumbei*
Notogomphus spinosus	*Phyllogomphus coloratus*	*Sapho orichalcea*	*Umma saphirina*
Nubiolestes diotima	*Phyllogomphus selysi*	*Sapho puella*	*Urothemis assignata*
Olpogastra lugubris	*Phyllomacromia bicristulata*	*Stenocnemis pachystigma*	*Zygonyx flavicosta*
Orthetrum africanum	*Phyllomacromia caneri*	*Stenocypha gracilis*	*Zygonyx speciosus*
Orthetrum austeni	*Phyllomacromia funicularioides*	*Tetrathemis camerunensis*	*Zygonyx torridus*
Orthetrum brachiale	*Phyllomacromia lieftincki*	*Tetrathemis godiardi*	*Zyxomma atlanticum*

FW520: Lake Chad (75 species, 357 records)

Species	Species	Species	Species
Agriocnemis exilis	*Chlorocypha curta*	*Neurogomphus featheri*	*Palpopleura jucunda*
Agriocnemis forcipata	*Crocothemis erythraea*	*Notogomphus moorei*	*Palpopleura lucia*
Agriocnemis victoria	*Crocothemis sanguinolenta*	*Olpogastra lugubris*	*Palpopleura portia*
Agriocnemis zerafica	*Diplacodes lefebvrii*	*Orthetrum abbotti*	*Pantala flavescens*
Anax ephippiger	*Diplacodes luminans*	*Orthetrum angustiventre*	*Paragomphus genei*
Anax speratus	*Hemistigma albipunctum*	*Orthetrum brachiale*	*Parazyxomma flavicans*
Anax tristis	*Ictinogomphus ferox*	*Orthetrum caffrum*	*Phyllomacromia hervei*
Azuragrion vansomereni	*Ictinogomphus regisalberti*	*Orthetrum chrysostigma*	*Proischnura subfurcata*
Brachythemis impartita	*Ischnura senegalensis*	*Orthetrum hintzi*	*Pseudagrion coeleste*
Brachythemis lacustris	*Lestes dissimulans*	*Orthetrum icteromelas*	*Pseudagrion glaucescens*
Brachythemis leucosticta	*Lestes ictericus*	*Orthetrum julia*	*Pseudagrion hamoni*
Brachythemis wilsoni	*Lestes pallidus*	*Orthetrum trinacria*	*Pseudagrion kersteni*
Ceriagrion glabrum	*Lestes plagiatus*	*Oxythemis phoenicosceles*	*Pseudagrion massaicum*
Ceriagrion suave	*Lestes tridens*	*Palpopleura deceptor*	*Pseudagrion melanicterum*

FW520: Lake Chad (*continued*)

Species	Species	Species	Species
Pseudagrion nubicum	*Rhyothemis semihyalina*	*Trithemis arteriosa*	*Trithemis kirbyi*
Pseudagrion sjoestedti	*Tetrathemis polleni*	*Trithemis dejouxi*	*Trithemis stictica*
Pseudagrion sublacteum	*Tholymis tillarga*	*Trithemis dichroa*	*Urothemis edwardsii*
Pseudagrion sudanicum	*Tramea basilaris*	*Trithemis furva*	*Zygonyx torridus*
Pseudagrion torridum	*Trithemis annulata*	*Trithemis hecate*	

FW521: Lake Victoria Basin (211 species, 4 422 records)

Species	Species	Species	Species
Aciagrion africanum	*Atoconeura pseudeudoxia*	*Diplacodes luminans*	*Lestes virgatus*
Aciagrion gracile	*Azuragrion nigridorsum*	*Elattoneura glauca*	*Lestinogomphus angustus*
Acisoma inflatum	*Azuragrion vansomereni*	*Elattoneura nigra*	*Malgassophlebia bispina*
Acisoma trifidum	*Brachythemis impartita*	*Elattoneura vittata*	*Mesocnemis singularis*
Acisoma variegatum	*Brachythemis lacustris*	*Gomphidia bredoi*	*Micromacromia camerunica*
Aethiothemis solitaria	*Brachythemis leucosticta*	*Gynacantha africana*	*Neodythemis munyaga*
Aethriamanta rezia	*Brachythemis wilsoni*	*Gynacantha bullata*	*Nesciothemis farinosa*
Africallagma elongatum	*Bradinopyga cornuta*	*Gynacantha cylindrata*	*Neurogomphus featheri*
Africallagma glaucum	*Bradinopyga strachani*	*Gynacantha manderica*	*Notiothemis jonesi*
Africallagma pseudelongatum	*Ceriagrion bakeri*	*Gynacantha nigeriensis*	*Notiothemis robertsi*
Africallagma subtile	*Ceriagrion corallinum*	*Gynacantha vesiculata*	*Notogomphus dorsalis*
Africallagma vaginale	*Ceriagrion glabrum*	*Gynacantha victoriae*	*Notogomphus lecythus*
Afroaeschna scotias	*Ceriagrion kordofanicum*	*Gynacantha villosa*	*Notogomphus leroyi*
Agriocnemis exilis	*Ceriagrion platystigma*	*Hadrothemis camarensis*	*Notogomphus lujai*
Agriocnemis forcipata	*Ceriagrion suave*	*Hadrothemis coacta*	*Notogomphus maathaiae*
Agriocnemis gratiosa	*Ceriagrion varians*	*Hadrothemis defecta*	*Olpogastra lugubris*
Agriocnemis inversa	*Ceriagrion whellani*	*Hadrothemis infesta*	*Onychogomphus styx*
Agriocnemis maclachlani	*Chalcostephia flavifrons*	*Heliaeschna cynthiae*	*Orthetrum abbotti*
Agriocnemis palaeforma	*Chlorocypha cancellata*	*Heliaeschna fuliginosa*	*Orthetrum austeni*
Agriocnemis victoria	*Chlorocypha curta*	*Heliaeschna ugandica*	*Orthetrum brachiale*
Agriocnemis zerafica	*Chlorocypha trifaria*	*Hemicordulia africana*	*Orthetrum caffrum*
Allocnemis nigripes	*Chlorocypha victoriae*	*Hemistigma albipunctum*	*Orthetrum camerunense*
Allocnemis pauli	*Copera nyansana*	*Ictinogomphus ferox*	*Orthetrum chrysostigma*
Allocnemis superba	*Copera sikassoensis*	*Ischnura senegalensis*	*Orthetrum guineense*
Anaciaeschna triangulifera	*Crenigomphus hartmanni*	*Lestes amicus*	*Orthetrum hintzi*
Anax chloromelas	*Crenigomphus renei*	*Lestes dissimulans*	*Orthetrum icteromelas*
Anax ephippiger	*Crocothemis divisa*	*Lestes ictericus*	*Orthetrum julia*
Anax imperator	*Crocothemis erythraea*	*Lestes ochraceus*	*Orthetrum machadoi*
Anax speratus	*Crocothemis sanguinolenta*	*Lestes pallidus*	*Orthetrum microstigma*
Anax tristis	*Diastatomma selysi*	*Lestes plagiatus*	*Orthetrum monardi*
Atoconeura eudoxia	*Diplacodes deminuta*	*Lestes tridens*	*Orthetrum stemmale*
Atoconeura kenya	*Diplacodes lefebvrii*	*Lestes uncifer*	*Orthetrum trinacria*

FW521: Lake Victoria Basin (*continued*)

Species	Species	Species	Species
Oxythemis phoenicosceles	*Pinheyschna rileyi*	*Pseudagrion sudanicum*	*Trithemis grouti*
Palpopleura deceptor	*Platycypha caligata*	*Pseudagrion torridum*	*Trithemis hecate*
Palpopleura jucunda	*Platycypha lacustris*	*Rhyothemis fenestrina*	*Trithemis imitata*
Palpopleura lucia	*Proischnura subfurcata*	*Rhyothemis semihyalina*	*Trithemis integra*
Palpopleura portia	*Pseudagrion assegaii*	*Stenocypha jacksoni*	*Trithemis kirbyi*
Pantala flavescens	*Pseudagrion bicoerulans*	*Stenocypha molindica*	*Trithemis nuptialis*
Paragomphus alluaudi	*Pseudagrion gamblesi*	*Stenocypha tenuis*	*Trithemis pluvialis*
Paragomphus cognatus	*Pseudagrion glaucescens*	*Tetrathemis camerunensis*	*Trithemis pruinata*
Paragomphus elpidius	*Pseudagrion hageni*	*Tetrathemis corduliformis*	*Trithemis stictica*
Paragomphus genei	*Pseudagrion hamoni*	*Tetrathemis polleni*	*Trithemis werneri*
Paragomphus viridior	*Pseudagrion kersteni*	*Thermochoria equivocata*	*Trithetrum navasi*
Parazyxomma flavicans	*Pseudagrion kibalense*	*Tholymis tillarga*	*Umma saphirina*
Phaon iridipennis	*Pseudagrion massaicum*	*Tramea basilaris*	*Urothemis assignata*
Phyllogomphus selysi	*Pseudagrion melanicterum*	*Tramea limbata*	*Urothemis edwardsii*
Phyllomacromia aureozona	*Pseudagrion niloticum*	*Trithemis aconita*	*Zosteraeschna ellioti*
Phyllomacromia contumax	*Pseudagrion nubicum*	*Trithemis annulata*	*Zygonyx flavicosta*
Phyllomacromia funicularioides	*Pseudagrion rufocinctum*	*Trithemis arteriosa*	*Zygonyx natalensis*
Phyllomacromia melania	*Pseudagrion salisburyense*	*Trithemis dichroa*	*Zygonyx regisalberti*
Phyllomacromia picta	*Pseudagrion sjoestedti*	*Trithemis donaldsoni*	*Zygonyx torridus*
Phyllomacromia sylvatica	*Pseudagrion spernatum*	*Trithemis dorsalis*	*Zyxomma atlanticum*
Pinheyschna meruensis	*Pseudagrion sublacteum*	*Trithemis furva*	

FW522: Upper Nile (182 species, 1 276 records)

Species	Species	Species	Species
Aciagrion gracile	*Allocnemis superba*	*Ceriagrion corallinum*	*Crocothemis erythraea*
Acisoma inflatum	*Anax ephippiger*	*Ceriagrion glabrum*	*Crocothemis sanguinolenta*
Acisoma variegatum	*Anax imperator*	*Ceriagrion kordofanicum*	*Diastatomma selysi*
Aethiothemis solitaria	*Anax parthenope*	*Ceriagrion suave*	*Diplacodes deminuta*
Aethriamanta rezia	*Anax speratus*	*Ceriagrion varians*	*Diplacodes lefebvrii*
Africallagma elongatum	*Anax tristis*	*Chalcostephia flavifrons*	*Diplacodes luminans*
Africallagma pseudelongatum	*Atoconeura kenya*	*Chlorocypha cancellata*	*Elattoneura glauca*
Africallagma subtile	*Atoconeura pseudeudoxia*	*Chlorocypha consueta*	*Elattoneura lliba*
Agriocnemis exilis	*Azuragrion vansomereni*	*Chlorocypha curta*	*Gomphidia bredoi*
Agriocnemis forcipata	*Brachythemis impartita*	*Chlorocypha trifaria*	*Gynacantha africana*
Agriocnemis gratiosa	*Brachythemis lacustris*	*Chlorocypha victoriae*	*Gynacantha bullata*
Agriocnemis inversa	*Brachythemis leucosticta*	*Copera nyansana*	*Gynacantha cylindrata*
Agriocnemis maclachlani	*Brachythemis wilsoni*	*Copera sikassoensis*	*Gynacantha manderica*
Agriocnemis zerafica	*Bradinopyga cornuta*	*Crenigomphus hartmanni*	*Gynacantha nigeriensis*
Allocnemis nigripes	*Bradinopyga strachani*	*Crenigomphus renei*	*Gynacantha sextans*
Allocnemis pauli	*Ceriagrion bakeri*	*Crocothemis divisa*	*Gynacantha vesiculata*

FW522: Upper Nile (*continued*)

Species	Species	Species	Species
Gynacantha villosa	*Onychogomphus styx*	*Phyllomacromia aureozona*	*Thermochoria equivocata*
Hadrothemis camarensis	*Orthetrum abbotti*	*Phyllomacromia contumax*	*Tholymis tillarga*
Hadrothemis coacta	*Orthetrum angustiventre*	*Phyllomacromia picta*	*Tramea basilaris*
Hadrothemis defecta	*Orthetrum brachiale*	*Phyllomacromia sylvatica*	*Trithemis aconita*
Hadrothemis infesta	*Orthetrum caffrum*	*Pinheyschna rileyi*	*Trithemis aenea*
Hemicordulia africana	*Orthetrum chrysostigma*	*Platycypha caligata*	*Trithemis annulata*
Hemistigma albipunctum	*Orthetrum guineense*	*Platycypha lacustris*	*Trithemis arteriosa*
Ictinogomphus ferox	*Orthetrum hintzi*	*Proischnura subfurcata*	*Trithemis dichroa*
Ictinogomphus regisalberti	*Orthetrum icteromelas*	*Pseudagrion glaucescens*	*Trithemis dorsalis*
Ischnura senegalensis	*Orthetrum julia*	*Pseudagrion glaucoideum*	*Trithemis furva*
Lestes dissimulans	*Orthetrum microstigma*	*Pseudagrion glaucum*	*Trithemis hecate*
Lestes ictericus	*Orthetrum sabina*	*Pseudagrion hageni*	*Trithemis imitata*
Lestes ochraceus	*Orthetrum saegeri*	*Pseudagrion hamoni*	*Trithemis integra*
Lestes pallidus	*Orthetrum stemmale*	*Pseudagrion kersteni*	*Trithemis kirbyi*
Lestes pinheyi	*Orthetrum trinacria*	*Pseudagrion kibalense*	*Trithemis nuptialis*
Lestes plagiatus	*Oxythemis phoenicosceles*	*Pseudagrion massaicum*	*Trithemis pruinata*
Lestes uncifer	*Palpopleura deceptor*	*Pseudagrion melanicterum*	*Trithemis stictica*
Lestes virgatus	*Palpopleura jucunda*	*Pseudagrion niloticum*	*Trithemis werneri*
Lestinogomphus angustus	*Palpopleura lucia*	*Pseudagrion nubicum*	*Trithetrum navasi*
Mesocnemis robusta	*Palpopleura portia*	*Pseudagrion salisburyense*	*Umma saphirina*
Mesocnemis singularis	*Pantala flavescens*	*Pseudagrion sjoestedti*	*Urothemis assignata*
Micromacromia camerunica	*Paragomphus cognatus*	*Pseudagrion spernatum*	*Urothemis edwardsii*
Neodythemis afra	*Paragomphus elpidius*	*Pseudagrion sublacteum*	*Zygonoides fraseri*
Neodythemis preussi	*Paragomphus genei*	*Pseudagrion sudanicum*	*Zygonyx flavicosta*
Nesciothemis farinosa	*Paragomphus pumilio*	*Pseudagrion torridum*	*Zygonyx natalensis*
Notiothemis robertsi	*Paragomphus viridior*	*Rhyothemis semihyalina*	*Zygonyx regisalberti*
Notogomphus dorsalis	*Parazyxomma flavicans*	*Stenocypha molindica*	*Zygonyx torridus*
Notogomphus leroyi	*Phaon iridipennis*	*Sympetrum fonscolombii*	*Zyxomma atlanticum*
Notogomphus lujai	*Phyllogomphus annulus*	*Tetrathemis camerunensis*	
Olpogastra lugubris	*Phyllogomphus selysi*	*Tetrathemis polleni*	

FW523: Lower Nile (27 species, 398 records)

Species	Species	Species	Species
Anax ephippiger	*Ischnura senegalensis*	*Orthetrum trinacria*	*Pseudagrion torridum*
Anax imperator	*Lestes virens*	*Pantala flavescens*	*Selysiothemis nigra*
Anax parthenope	*Mesocnemis robusta*	*Paragomphus pumilio*	*Sympetrum fonscolombii*
Brachythemis impartita	*Nesciothemis farinosa*	*Pinheyschna waterstoni*	*Trithemis annulata*
Brachythemis leucosticta	*Orthetrum chrysostigma*	*Pseudagrion hamoni*	*Trithemis arteriosa*
Crocothemis erythraea	*Orthetrum ransonnetii*	*Pseudagrion niloticum*	*Trithemis kirbyi*
Diplacodes lefebvrii	*Orthetrum sabina*	*Pseudagrion nubicum*	

FW524: Nile Delta (27 species, 469 records)

Species	Species	Species	Species
Aeshna mixta	*Crocothemis erythraea*	*Orthetrum sabina*	*Selysiothemis nigra*
Agriocnemis sania	*Diplacodes lefebvrii*	*Orthetrum trinacria*	*Sympecma fusca*
Anax ephippiger	*Ischnura senegalensis*	*Pantala flavescens*	*Sympetrum fonscolombii*
Anax imperator	*Mesocnemis robusta*	*Paragomphus pumilio*	*Sympetrum sinaiticum*
Anax parthenope	*Nesciothemis farinosa*	*Pseudagrion niloticum*	*Trithemis annulata*
Brachythemis impartita	*Orthetrum chrysostigma*	*Pseudagrion nubicum*	*Trithemis arteriosa*
Ceriagrion glabrum	*Orthetrum ransonnetii*	*Pseudagrion torridum*	

FW525: Ethiopian Highlands (75 species, 386 records)

Species	Species	Species	Species
Africallagma elongatum	*Ischnura abyssinica*	*Palpopleura lucia*	*Pseudagrion spernatum*
Africallagma subtile	*Ischnura senegalensis*	*Palpopleura portia*	*Pseudagrion sublacteum*
Agriocnemis exilis	*Lestes pallidus*	*Pantala flavescens*	*Rhyothemis semihyalina*
Agriocnemis sania	*Lestes virgatus*	*Paragomphus alluaudi*	*Sympetrum fonscolombii*
Anaciaeschna triangulifera	*Nesciothemis farinosa*	*Paragomphus crenigomphoides*	*Tramea basilaris*
Anax ephippiger	*Notogomphus cottarellii*	*Paragomphus genei*	*Trithemis aconita*
Anax imperator	*Notogomphus dorsalis*	*Phaon iridipennis*	*Trithemis annulata*
Anax speratus	*Notogomphus ruppeli*	*Phyllomacromia picta*	*Trithemis arteriosa*
Atoconeura aethiopica	*Orthetrum abbotti*	*Pinheyschna waterstoni*	*Trithemis dejouxi*
Azuragrion vansomereni	*Orthetrum caffrum*	*Platycypha caligata*	*Trithemis ellenbeckii*
Brachythemis leucosticta	*Orthetrum chrysostigma*	*Proischnura subfurcata*	*Trithemis furva*
Bradinopyga strachani	*Orthetrum guineense*	*Pseudagrion commoniae*	*Trithemis imitata*
Chalcostephia flavifrons	*Orthetrum hintzi*	*Pseudagrion gamblesi*	*Trithemis kirbyi*
Crocothemis erythraea	*Orthetrum julia*	*Pseudagrion guichardi*	*Trithemis stictica*
Crocothemis sanguinolenta	*Orthetrum kristenseni*	*Pseudagrion hamoni*	*Urothemis assignata*
Diplacodes lefebvrii	*Orthetrum stemmale*	*Pseudagrion kaffinum*	*Zosteraeschna ellioti*
Elattoneura pasquinii	*Orthetrum trinacria*	*Pseudagrion kersteni*	*Zygonyx natalensis*
Gynacantha nigeriensis	*Palpopleura deceptor*	*Pseudagrion massaicum*	*Zygonyx torridus*
Hemistigma albipunctum	*Palpopleura jucunda*	*Pseudagrion niloticum*	

FW526: Lake Tana (29 species, 72 records)

Species	Species	Species	Species
Agriocnemis inversa	*Bradinopyga strachani*	*Nesciothemis farinosa*	*Pinheyschna waterstoni*
Anaciaeschna triangulifera	*Ceriagrion glabrum*	*Notogomphus lecythus*	*Platycypha caligata*
Anax imperator	*Crocothemis erythraea*	*Orthetrum brachiale*	*Proischnura subfurcata*
Brachythemis impartita	*Diplacodes lefebvrii*	*Orthetrum chrysostigma*	*Pseudagrion commoniae*
Brachythemis lacustris	*Ischnura senegalensis*	*Palpopleura lucia*	*Pseudagrion kaffinum*

FW526: Lake Tana (*continued*)

Species	Species	Species
Pseudagrion massaicum	*Pseudagrion sublacteum*	*Trithemis furva*
Pseudagrion salisburyense	*Trithemis annulata*	*Trithemis stictica*
Pseudagrion spernatum	*Trithemis arteriosa*	*Zygonyx natalensis*

FW527: Western Red Sea Drainages (25 species, 81 records)

Species	Species	Species	Species
Africallagma elongatum	*Hemistigma albipunctum*	*Orthetrum sabina*	*Trithemis annulata*
Anax ephippiger	*Ischnura evansi*	*Pantala flavescens*	*Trithemis arteriosa*
Anax imperator	*Ischnura senegalensis*	*Paragomphus genei*	*Trithemis ellenbeckii*
Anax parthenope	*Orthetrum caffrum*	*Paragomphus sinaiticus*	*Trithemis furva*
Anax speratus	*Orthetrum chrysostigma*	*Proischnura subfurcata*	
Brachythemis leucosticta	*Orthetrum julia*	*Pseudagrion kersteni*	
Crocothemis erythraea	*Orthetrum ransonnetii*	*Sympetrum fonscolombii*	

FW528: Northern Eastern Rift (69 species, 273 records)

Species	Species	Species	Species
Acisoma inflatum	*Diplacodes lefebvrii*	*Palpopleura portia*	*Pseudagrion sublacteum*
Acisoma variegatum	*Gynacantha vesiculata*	*Pantala flavescens*	*Pseudagrion torridum*
Africallagma elongatum	*Ictinogomphus ferox*	*Paragomphus crenigomphoides*	*Rhyothemis semihyalina*
Agriocnemis inversa	*Ischnura abyssinica*	*Paragomphus genei*	*Tramea limbata*
Agriocnemis sania	*Ischnura evansi*	*Phaon iridipennis*	*Trithemis annulata*
Anaciaeschna triangulifera	*Ischnura senegalensis*	*Phyllomacromia pallidinervis*	*Trithemis arteriosa*
Anax ephippiger	*Nesciothemis farinosa*	*Phyllomacromia picta*	*Trithemis dejouxi*
Anax imperator	*Notogomphus ruppeli*	*Pinheyschna waterstoni*	*Trithemis ellenbeckii*
Anax speratus	*Orthetrum abbotti*	*Platycypha caligata*	*Trithemis furva*
Atoconeura aethiopica	*Orthetrum caffrum*	*Proischnura subfurcata*	*Trithemis imitata*
Azuragrion vansomereni	*Orthetrum chrysostigma*	*Pseudagrion commoniae*	*Trithemis kirbyi*
Brachythemis impartita	*Orthetrum julia*	*Pseudagrion guichardi*	*Urothemis assignata*
Brachythemis lacustris	*Orthetrum kristenseni*	*Pseudagrion hamoni*	*Urothemis edwardsii*
Brachythemis leucosticta	*Orthetrum monardi*	*Pseudagrion kersteni*	*Zosteraeschna ellioti*
Ceriagrion glabrum	*Orthetrum sabina*	*Pseudagrion massaicum*	*Zygonyx natalensis*
Crenigomphus renei	*Orthetrum trinacria*	*Pseudagrion niloticum*	
Crocothemis erythraea	*Palpopleura jucunda*	*Pseudagrion nubicum*	
Crocothemis sanguinolenta	*Palpopleura lucia*	*Pseudagrion spernatum*	

FW529: Horn of Africa (26 species, 111 records)

Species	Species	Species	Species
Anax ephippiger	*Nesciothemis farinosa*	*Orthetrum stemmale*	*Trithemis annulata*
Anax imperator	*Orthetrum abbotti*	*Orthetrum trinacria*	*Trithemis arteriosa*
Anax parthenope	*Orthetrum brachiale*	*Palpopleura lucia*	*Trithemis furva*
Anax speratus	*Orthetrum chrysostigma*	*Pantala flavescens*	*Trithemis kirbyi*
Crocothemis erythraea	*Orthetrum guineense*	*Pseudagrion kersteni*	*Trithemis stictica*
Diplacodes lefebvrii	*Orthetrum julia*	*Pseudagrion lindicum*	
Ischnura senegalensis	*Orthetrum sabina*	*Pseudagrion sublacteum*	

FW530: Lake Turkana (88 species, 328 records)

Species	Species	Species	Species
Africallagma elongatum	*Gynacantha villosa*	*Palpopleura deceptor*	*Pseudagrion niloticum*
Africallagma subtile	*Ictinogomphus ferox*	*Palpopleura jucunda*	*Pseudagrion nubicum*
Agriocnemis inversa	*Ischnura senegalensis*	*Palpopleura lucia*	*Pseudagrion spernatum*
Agriocnemis sania	*Lestes tridens*	*Palpopleura portia*	*Pseudagrion sublacteum*
Anaciaeschna triangulifera	*Lestes virgatus*	*Pantala flavescens*	*Rhyothemis semihyalina*
Anax ephippiger	*Nesciothemis farinosa*	*Paragomphus crenigomphoides*	*Tetrathemis polleni*
Anax imperator	*Notogomphus cottarellii*	*Paragomphus elpidius*	*Tholymis tillarga*
Anax speratus	*Notogomphus lecythus*	*Paragomphus genei*	*Tramea limbata*
Atoconeura aethiopica	*Notogomphus ruppeli*	*Paragomphus pumilio*	*Trithemis annulata*
Brachythemis impartita	*Olpogastra lugubris*	*Paragomphus sabicus*	*Trithemis arteriosa*
Brachythemis lacustris	*Orthetrum abbotti*	*Phaon iridipennis*	*Trithemis ellenbeckii*
Brachythemis leucosticta	*Orthetrum brachiale*	*Phyllomacromia picta*	*Trithemis furva*
Bradinopyga cornuta	*Orthetrum caffrum*	*Pinheyschna rileyi*	*Trithemis imitata*
Ceriagrion glabrum	*Orthetrum chrysostigma*	*Pinheyschna waterstoni*	*Trithemis kirbyi*
Crenigomphus hartmanni	*Orthetrum guineense*	*Platycypha caligata*	*Trithemis stictica*
Crocothemis erythraea	*Orthetrum hintzi*	*Proischnura subfurcata*	*Trithemis werneri*
Crocothemis sanguinolenta	*Orthetrum julia*	*Pseudagrion gamblesi*	*Urothemis assignata*
Diplacodes lefebvrii	*Orthetrum kristenseni*	*Pseudagrion guichardi*	*Urothemis edwardsii*
Diplacodes luminans	*Orthetrum machadoi*	*Pseudagrion hamoni*	*Zosteraeschna ellioti*
Elattoneura glauca	*Orthetrum monardi*	*Pseudagrion kaffinum*	*Zygonoides fuelleborni*
Elattoneura pasquinii	*Orthetrum stemmale*	*Pseudagrion kersteni*	*Zygonyx natalensis*
Gomphidia quarrei	*Orthetrum trinacria*	*Pseudagrion massaicum*	*Zygonyx torridus*

FW531: Shebelle – Juba (74 species, 445 records)

Species	Species	Species	Species
Africallagma elongatum	*Agriocnemis exilis*	*Anax imperator*	*Atoconeura kenya*
Africallagma glaucum	*Agriocnemis gratiosa*	*Anax speratus*	*Azuragrion nigridorsum*
Africallagma pseudelongatum	*Anax ephippiger*	*Anax tristis*	*Brachythemis impartita*

FW531: Shebelle – Juba (*continued*)

Species	Species	Species	Species
Brachythemis lacustris	*Lestes uncifer*	*Palpopleura portia*	*Pseudagrion sublacteum*
Brachythemis leucosticta	*Macrodiplax cora*	*Pantala flavescens*	*Rhyothemis semihyalina*
Bradinopyga cornuta	*Nesciothemis farinosa*	*Paragomphus elpidius*	*Sympetrum fonscolombii*
Ceriagrion glabrum	*Notiothemis jonesi*	*Paragomphus genei*	*Tetrathemis polleni*
Ceriagrion suave	*Notogomphus kilimandjaricus*	*Phaon iridipennis*	*Tholymis tillarga*
Crocothemis erythraea	*Olpogastra lugubris*	*Phyllomacromia contumax*	*Tramea basilaris*
Crocothemis sanguinolenta	*Orthetrum abbotti*	*Platycypha amboniensis*	*Tramea limbata*
Diplacodes lefebvrii	*Orthetrum brachiale*	*Platycypha caligata*	*Trithemis annulata*
Diplacodes luminans	*Orthetrum caffrum*	*Proischnura subfurcata*	*Trithemis arteriosa*
Elattoneura glauca	*Orthetrum chrysostigma*	*Pseudagrion bicoerulans*	*Trithemis furva*
Gynacantha manderica	*Orthetrum julia*	*Pseudagrion gamblesi*	*Trithemis kirbyi*
Hemistigma albipunctum	*Orthetrum sabina*	*Pseudagrion kersteni*	*Urothemis assignata*
Ictinogomphus ferox	*Orthetrum stemmale*	*Pseudagrion lindicum*	*Zosteraeschna ellioti*
Ischnura senegalensis	*Orthetrum trinacria*	*Pseudagrion massaicum*	*Zygonyx torridus*
Lestes pallidus	*Palpopleura deceptor*	*Pseudagrion niloticum*	
Lestes tridens	*Palpopleura lucia*	*Pseudagrion spernatum*	

FW532: Ogooue – Nyanga – Kouilou – Niari (226 species, 9 750 records)

Species	Species	Species	Species
Aciagrion africanum	*Allocnemis nigripes*	*Chlorocypha aphrodite*	*Diplacodes luminans*
Aciagrion balachowskyi	*Allocnemis pauli*	*Chlorocypha cancellata*	*Elattoneura acuta*
Aciagrion brosseti	*Anax chloromelas*	*Chlorocypha curta*	*Elattoneura incerta*
Aciagrion nodosum	*Anax congoliath*	*Chlorocypha cyanifrons*	*Elattoneura josemorai*
Acisoma inflatum	*Anax ephippiger*	*Chlorocypha glauca*	*Elattoneura lliba*
Acisoma trifidum	*Anax imperator*	*Chlorocypha helenae*	*Elattoneura mayombensis*
Aethiothemis basilewskyi	*Anax tristis*	*Chlorocypha pyriformosa*	*Elattoneura morini*
Aethiothemis erythromelas	*Atoconeura luxata*	*Chlorocypha rubida*	*Elattoneura tsiamae*
Aethiothemis mediofasciata	*Azuragrion buchholzi*	*Copera congolensis*	*Elattoneura vittata*
Aethiothemis solitaria	*Brachythemis impartita*	*Copera nyansana*	*Elattoneura vrijdaghi*
Aethriamanta rezia	*Brachythemis lacustris*	*Copera rufipes*	*Eleuthemis buettikoferi*
Africallagma vaginale	*Bradinopyga strachani*	*Cornigomphus guineensis*	*Gomphidia gamblesi*
Africocypha lacuselephantum	*Ceriagrion annulatum*	*Crocothemis divisa*	*Gomphidia quarrei*
Afroaeschna scotias	*Ceriagrion bakeri*	*Crocothemis erythraea*	*Gynacantha africana*
Agriocnemis exilis	*Ceriagrion corallinum*	*Crocothemis sanguinolenta*	*Gynacantha bullata*
Agriocnemis forcipata	*Ceriagrion glabrum*	*Cyanothemis simpsoni*	*Gynacantha cylindrata*
Agriocnemis maclachlani	*Ceriagrion platystigma*	*Diastatomma multilineatum*	*Gynacantha sextans*
Agriocnemis stygia	*Ceriagrion tricrenaticeps*	*Diastatomma selysi*	*Gynacantha vesiculata*
Agriocnemis victoria	*Ceriagrion varians*	*Diastatomma tricolor*	*Gynacantha victoriae*
Allocnemis contraria	*Ceriagrion whellani*	*Diplacodes deminuta*	*Hadrothemis camarensis*
Allocnemis cyanura	*Chalcostephia flavifrons*	*Diplacodes lefebvrii*	*Hadrothemis coacta*

FW532: Ogooue – Nyanga – Kouilou – Niari (*continued*)

Species	Species	Species	Species
Hadrothemis defecta	*Orthetrum africanum*	*Porpax bipunctus*	*Tragogomphus ellioti*
Hadrothemis infesta	*Orthetrum austeni*	*Porpax garambensis*	*Tramea basilaris*
Hadrothemis versuta	*Orthetrum brachiale*	*Porpax sentipes*	*Trithemis aconita*
Heliaeschna cynthiae	*Orthetrum chrysostigma*	*Pseudagrion bernardi*	*Trithemis aenea*
Heliaeschna fuliginosa	*Orthetrum guineense*	*Pseudagrion camerunense*	*Trithemis apicalis*
Heliaeschna sembe	*Orthetrum hintzi*	*Pseudagrion coeruleipunctum*	*Trithemis arteriosa*
Heliaeschna ugandica	*Orthetrum icteromelas*	*Pseudagrion epiphonematicum*	*Trithemis basitincta*
Hemistigma albipunctum	*Orthetrum julia*	*Pseudagrion glaucescens*	*Trithemis bifida*
Ictinogomphus fraseri	*Orthetrum microstigma*	*Pseudagrion glaucoideum*	*Trithemis congolica*
Ictinogomphus regisalberti	*Orthetrum saegeri*	*Pseudagrion glaucum*	*Trithemis dichroa*
Idomacromia proavita	*Orthetrum stemmale*	*Pseudagrion grilloti*	*Trithemis fumosa*
Ischnura senegalensis	*Orthetrum trinacria*	*Pseudagrion hamoni*	*Trithemis grouti*
Lestes dissimulans	*Oxythemis phoenicosceles*	*Pseudagrion helenae*	*Trithemis hartwigi*
Lestes ochraceus	*Palpopleura albifrons*	*Pseudagrion hemicolon*	*Trithemis hecate*
Lestes pinheyi	*Palpopleura lucia*	*Pseudagrion isidromorai*	*Trithemis imitata*
Lestes tridens	*Palpopleura portia*	*Pseudagrion kibalense*	*Trithemis kirbyi*
Lestes uncifer	*Pantala flavescens*	*Pseudagrion melanicterum*	*Trithemis nuptialis*
Lestinogomphus congoensis	*Paragomphus abnormis*	*Pseudagrion serrulatum*	*Trithemis osvaldae*
Libyogomphus emiliae	*Paragomphus machadoi*	*Pseudagrion simonae*	*Trithemis palustris*
Libyogomphus tenaculatus	*Paragomphus nigroviridis*	*Pseudagrion simplicilaminatum*	*Trithemis pruinata*
Malgassophlebia bispina	*Paragomphus serrulatus*	*Pseudagrion sjoestedti*	*Trithemis stictica*
Malgassophlebia westfalli	*Parazyxomma flavicans*	*Pseudagrion sublacteum*	*Trithemis tropicana*
Micromacromia camerunica	*Phaon camerunensis*	*Pseudagrion torridum*	*Trithetrum congoense*
Micromacromia zygoptera	*Phaon iridipennis*	*Rhyothemis fenestrina*	*Trithetrum navasi*
Neodythemis afra	*Phyllogomphus annulus*	*Rhyothemis notata*	*Umma cincta*
Neodythemis klingi	*Phyllogomphus coloratus*	*Rhyothemis semihyalina*	*Umma longistigma*
Neodythemis preussi	*Phyllomacromia aureozona*	*Sapho bicolor*	*Umma mesostigma*
Neodythemis takamandensis	*Phyllomacromia bicristulata*	*Sapho gloriosa*	*Urothemis assignata*
Neophya rutherfordi	*Phyllomacromia contumax*	*Sapho orichalcea*	*Urothemis edwardsii*
Nesciothemis nigeriensis	*Phyllomacromia insignis*	*Stenocnemis pachystigma*	*Zygonyx flavicosta*
Neurolestes trinervis	*Phyllomacromia maesi*	*Stenocypha gracilis*	*Zygonyx natalensis*
Notiothemis robertsi	*Phyllomacromia melania*	*Tetrathemis camerunensis*	*Zygonyx regisalberti*
Notogomphus spinosus	*Phyllomacromia paula*	*Tetrathemis fraseri*	*Zygonyx torridus*
Nubiolestes diotima	*Platycypha picta*	*Tetrathemis longfieldae*	*Zyxomma atlanticum*
Olpogastra lugubris	*Platycypha rufitibia*	*Thermochoria equivocata*	
Orthetrum abbotti	*Porpax asperipes*	*Tholymis tillarga*	

FW533: Southern Gulf of Guinea Drainages – Bioko (182 species, 1 931 records)

Species	Species	Species	Species
Aciagrion africanum	*Acisoma trifidum*	*Agriocnemis exilis*	*Agriocnemis victoria*
Aciagrion balachowskyi	*Aethriamanta rezia*	*Agriocnemis forcipata*	*Agriocnemis zerafica*
Aciagrion brosseti	*Africallagma vaginale*	*Agriocnemis maclachlani*	*Allocnemis contraria*

FW533: Southern Gulf of Guinea Drainages – Bioko (*continued*)

Species	Species	Species	Species
Allocnemis cyanura	*Elattoneura nigra*	*Orthetrum africanum*	*Pseudagrion sjoestedti*
Allocnemis nigripes	*Elattoneura pruinosa*	*Orthetrum austeni*	*Pseudagrion sublacteum*
Anax congoliath	*Elattoneura vittata*	*Orthetrum brachiale*	*Rhyothemis fenestrina*
Anax imperator	*Eleuthemis buettikoferi*	*Orthetrum chrysostigma*	*Rhyothemis notata*
Anax tristis	*Gomphidia gamblesi*	*Orthetrum guineense*	*Rhyothemis semihyalina*
Atoconeura luxata	*Gynacantha africana*	*Orthetrum hintzi*	*Sapho bicolor*
Azuragrion buchholzi	*Gynacantha bullata*	*Orthetrum julia*	*Sapho gloriosa*
Brachythemis impartita	*Gynacantha cylindrata*	*Orthetrum microstigma*	*Sapho orichalcea*
Brachythemis lacustris	*Gynacantha sextans*	*Orthetrum saegeri*	*Stenocnemis pachystigma*
Bradinopyga strachani	*Gynacantha victoriae*	*Orthetrum stemmale*	*Stenocypha gracilis*
Ceriagrion annulatum	*Hadrothemis camarensis*	*Oxythemis phoenicosceles*	*Tetrathemis camerunensis*
Ceriagrion corallinum	*Hadrothemis coacta*	*Palpopleura albifrons*	*Tetrathemis fraseri*
Ceriagrion glabrum	*Hadrothemis defecta*	*Palpopleura lucia*	*Tetrathemis longfieldae*
Ceriagrion rubellocerinum	*Hadrothemis infesta*	*Palpopleura portia*	*Thermochoria equivocata*
Ceriagrion tricrenaticeps	*Hadrothemis versuta*	*Pantala flavescens*	*Tholymis tillarga*
Ceriagrion varians	*Heliaeschna fuliginosa*	*Parazyxomma flavicans*	*Tragogomphus ellioti*
Ceriagrion whellani	*Heliaeschna sembe*	*Phaon camerunensis*	*Tramea basilaris*
Chalcostephia flavifrons	*Hemistigma albipunctum*	*Phaon iridipennis*	*Tramea limbata*
Chlorocypha cancellata	*Ictinogomphus fraseri*	*Phyllogomphus coloratus*	*Trithemis aconita*
Chlorocypha curta	*Idomacromia proavita*	*Phyllogomphus selysi*	*Trithemis aenea*
Chlorocypha cyanifrons	*Lestes dissimulans*	*Phyllomacromia bicristulata*	*Trithemis annulata*
Chlorocypha glauca	*Lestes tridens*	*Phyllomacromia caneri*	*Trithemis arteriosa*
Chlorocypha helenae	*Lestes uncifer*	*Phyllomacromia contumax*	*Trithemis bredoi*
Chlorocypha neptunus	*Libyogomphus emiliae*	*Phyllomacromia funicularioides*	*Trithemis dichroa*
Chlorocypha rubida	*Libyogomphus tenaculatus*	*Phyllomacromia insignis*	*Trithemis grouti*
Chlorocypha victoriae	*Malgassophlebia bispina*	*Phyllomacromia melania*	*Trithemis hartwigi*
Copera nyansana	*Malgassophlebia westfalli*	*Phyllomacromia paula*	*Trithemis imitata*
Copera rufipes	*Mesocnemis singularis*	*Platycypha rufitibia*	*Trithemis nuptialis*
Cornigomphus guineensis	*Micromacromia camerunica*	*Porpax asperipes*	*Trithemis osvaldae*
Crocothemis divisa	*Micromacromia zygoptera*	*Porpax bipunctus*	*Trithemis pruinata*
Crocothemis erythraea	*Neodythemis afra*	*Pseudagrion camerunense*	*Trithemis tropicana*
Crocothemis sanguinolenta	*Neodythemis klingi*	*Pseudagrion epiphonematicum*	*Trithetrum navasi*
Cyanothemis simpsoni	*Neodythemis preussi*	*Pseudagrion glaucescens*	*Umma longistigma*
Diastatomma bicolor	*Neophya rutherfordi*	*Pseudagrion glaucoideum*	*Umma mesostigma*
Diastatomma selysi	*Nesciothemis pujoli*	*Pseudagrion glaucum*	*Urothemis assignata*
Diastatomma tricolor	*Neurogomphus alius*	*Pseudagrion hamoni*	*Urothemis edwardsii*
Diplacodes lefebvrii	*Neurogomphus fuscifrons*	*Pseudagrion hemicolon*	*Zygonyx flavicosta*
Diplacodes luminans	*Neurogomphus uelensis*	*Pseudagrion isidromorai*	*Zygonyx regisalberti*
Elattoneura acuta	*Neurolestes trinervis*	*Pseudagrion kersteni*	*Zygonyx speciosus*
Elattoneura balli	*Notiothemis robertsi*	*Pseudagrion kibalense*	*Zygonyx torridus*
Elattoneura josemorai	*Nubiolestes diotima*	*Pseudagrion melanicterum*	*Zyxomma atlanticum*
Elattoneura lliba	*Olpogastra lugubris*	*Pseudagrion nubicum*	
Elattoneura mayombensis	*Orthetrum abbotti*	*Pseudagrion serrulatum*	

FW534: Sangha (116 species, 422 records)

Species	Species	Species	Species
Aciagrion africanum	*Elattoneura centrafricana*	*Neurogomphus uelensis*	*Pseudagrion glaucoideum*
Acisoma trifidum	*Elattoneura incerta*	*Neurolestes trinervis*	*Pseudagrion glaucum*
Aethiothemis basilewskyi	*Elattoneura lindleyi*	*Notiothemis robertsi*	*Pseudagrion hamoni*
Aethiothemis erythromelas	*Elattoneura lliba*	*Notogomphus spinosus*	*Pseudagrion kersteni*
Aethriamanta rezia	*Elattoneura morini*	*Olpogastra lugubris*	*Pseudagrion melanicterum*
Africallagma subtile	*Elattoneura nigra*	*Orthetrum abbotti*	*Pseudagrion serrulatum*
Agriocnemis forcipata	*Elattoneura tsiamae*	*Orthetrum africanum*	*Pseudagrion simplicilaminatum*
Agriocnemis maclachlani	*Elattoneura vittata*	*Orthetrum austeni*	*Pseudagrion sjoestedti*
Agriocnemis victoria	*Elattoneura vrijdaghi*	*Orthetrum brachiale*	*Rhyothemis notata*
Allocnemis nigripes	*Gomphidia quarrei*	*Orthetrum hintzi*	*Sapho bicolor*
Atoconeura luxata	*Gynacantha africana*	*Orthetrum icteromelas*	*Sapho gloriosa*
Brachythemis lacustris	*Gynacantha bullata*	*Orthetrum julia*	*Stenocypha gracilis*
Ceriagrion annulatum	*Gynacantha cylindrata*	*Orthetrum microstigma*	*Thermochoria equivocata*
Ceriagrion corallinum	*Gynacantha nigeriensis*	*Orthetrum monardi*	*Tholymis tillarga*
Ceriagrion glabrum	*Hadrothemis camarensis*	*Orthetrum stemmale*	*Tramea basilaris*
Ceriagrion platystigma	*Hadrothemis coacta*	*Oxythemis phoenicosceles*	*Trithemis aenea*
Ceriagrion varians	*Hadrothemis defecta*	*Palpopleura albifrons*	*Trithemis arteriosa*
Ceriagrion whellani	*Hadrothemis infesta*	*Palpopleura lucia*	*Trithemis dichroa*
Chalcostephia flavifrons	*Hadrothemis versuta*	*Palpopleura portia*	*Trithemis fumosa*
Chlorocypha aphrodite	*Heliaeschna fuliginosa*	*Pantala flavescens*	*Trithemis grouti*
Chlorocypha cancellata	*Heliaeschna sembe*	*Phaon camerunensis*	*Trithemis imitata*
Chlorocypha curta	*Hemistigma albipunctum*	*Phaon iridipennis*	*Trithemis nuptialis*
Chlorocypha cyanifrons	*Ictinogomphus regisalberti*	*Phyllogomphus coloratus*	*Trithemis stictica*
Chlorocypha rubida	*Micromacromia camerunica*	*Phyllomacromia funicularioides*	*Trithemis tropicana*
Crocothemis erythraea	*Neodythemis afra*	*Phyllomacromia insignis*	*Trithetrum congoense*
Diastatomma selysi	*Neodythemis klingi*	*Platycypha picta*	*Umma longistigma*
Diastatomma tricolor	*Neodythemis preussi*	*Porpax asperipes*	*Urothemis assignata*
Diplacodes lefebvrii	*Neophya rutherfordi*	*Pseudagrion bernardi*	*Urothemis edwardsii*
Diplacodes luminans	*Neurogomphus alius*	*Pseudagrion glaucescens*	*Zygonyx regisalberti*

FW535: Sudanic Congo – Oubangi (148 species, 684 records)

Species	Species	Species	Species
Aciagrion africanum	*Agriocnemis victoria*	*Ceriagrion glabrum*	*Crocothemis erythraea*
Acisoma trifidum	*Agriocnemis zerafica*	*Ceriagrion whellani*	*Crocothemis sanguinolenta*
Aethiothemis basilewskyi	*Allocnemis cyanura*	*Chalcostephia flavifrons*	*Cyanothemis simpsoni*
Aethiothemis erythromelas	*Allocnemis nigripes*	*Chlorocypha aphrodite*	*Diastatomma multilineatum*
Aethriamanta rezia	*Anax imperator*	*Chlorocypha curta*	*Diastatomma selysi*
Agriocnemis exilis	*Anax tristis*	*Chlorocypha cyanifrons*	*Diplacodes deminuta*
Agriocnemis forcipata	*Brachythemis lacustris*	*Chlorocypha rubida*	*Diplacodes luminans*
Agriocnemis maclachlani	*Brachythemis leucosticta*	*Copera sikassoensis*	*Elattoneura centrafricana*
Agriocnemis stygia	*Bradinopyga strachani*	*Crenigomphus renei*	*Elattoneura incerta*

FW535: Sudanic Congo – Oubangi (*continued*)

Species	Species	Species	Species
Elattoneura nigra	*Nesciothemis minor*	*Phaon iridipennis*	*Tholymis tillarga*
Elattoneura vittata	*Nesciothemis pujoli*	*Phyllogomphus annulus*	*Tramea basilaris*
Elattoneura vrijdaghi	*Neurogomphus alius*	*Phyllogomphus coloratus*	*Trithemis aconita*
Gomphidia bredoi	*Neurogomphus martininus*	*Phyllomacromia contumax*	*Trithemis aenea*
Gomphidia quarrei	*Notiothemis robertsi*	*Phyllomacromia insignis*	*Trithemis annulata*
Gynacantha africana	*Olpogastra lugubris*	*Phyllomacromia maesi*	*Trithemis apicalis*
Gynacantha bullata	*Orthetrum africanum*	*Phyllomacromia paula*	*Trithemis arteriosa*
Gynacantha cylindrata	*Orthetrum austeni*	*Porpax asperipes*	*Trithemis bredoi*
Gynacantha sextans	*Orthetrum brachiale*	*Porpax garambensis*	*Trithemis congolica*
Gynacantha vesiculata	*Orthetrum chrysostigma*	*Porpax sentipes*	*Trithemis dichroa*
Hadrothemis camarensis	*Orthetrum guineense*	*Pseudagrion emarginatum*	*Trithemis fumosa*
Hadrothemis coacta	*Orthetrum hintzi*	*Pseudagrion glaucescens*	*Trithemis grouti*
Hadrothemis defecta	*Orthetrum julia*	*Pseudagrion glaucoideum*	*Trithemis imitata*
Hadrothemis infesta	*Orthetrum latihami*	*Pseudagrion glaucum*	*Trithemis kalula*
Hadrothemis versuta	*Orthetrum microstigma*	*Pseudagrion hamoni*	*Trithemis longistyla*
Hadrothemis vrijdaghi	*Orthetrum monardi*	*Pseudagrion kersteni*	*Trithemis nuptialis*
Heliaeschna cynthiae	*Orthetrum stemmale*	*Pseudagrion kibalense*	*Trithemis pruinata*
Heliaeschna fuliginosa	*Oxythemis phoenicosceles*	*Pseudagrion melanicterum*	*Trithemis tropicana*
Heliaeschna sembe	*Palpopleura albifrons*	*Pseudagrion sjoestedti*	*Trithetrum navasi*
Hemistigma albipunctum	*Palpopleura deceptor*	*Pseudagrion thenartum*	*Umma longistigma*
Ictinogomphus ferox	*Palpopleura lucia*	*Rhyothemis fenestrina*	*Umma mesostigma*
Ictinogomphus regisalberti	*Palpopleura portia*	*Rhyothemis notata*	*Urothemis edwardsii*
Lestes dissimulans	*Pantala flavescens*	*Sapho bicolor*	*Zygonoides occidentis*
Mesocnemis singularis	*Paragomphus acuminatus*	*Sapho gloriosa*	*Zygonyx flavicosta*
Micromacromia camerunica	*Paragomphus genei*	*Stenocypha gracilis*	*Zygonyx natalensis*
Neodythemis afra	*Paragomphus zambeziensis*	*Tetrathemis camerunensis*	*Zygonyx speciosus*
Neodythemis klingi	*Parazyxomma flavicans*	*Tetrathemis longfieldae*	*Zygonyx torridus*
Neodythemis preussi	*Phaon camerunensis*	*Thermochoria equivocata*	*Zyxomma atlanticum*

FW536: Uele (174 species, 501 records)

Species	Species	Species	Species
Aciagrion africanum	*Agriocnemis exilis*	*Anax ephippiger*	*Ceriagrion glabrum*
Aciagrion gracile	*Agriocnemis forcipata*	*Anax imperator*	*Ceriagrion suave*
Acisoma trifidum	*Agriocnemis maclachlani*	*Anax speratus*	*Ceriagrion tricrenaticeps*
Aethiothemis bella	*Agriocnemis victoria*	*Anax tristis*	*Ceriagrion varians*
Aethiothemis erythromelas	*Allocnemis cyanura*	*Brachythemis wilsoni*	*Ceriagrion whellani*
Aethiothemis solitaria	*Allocnemis nigripes*	*Bradinopyga strachani*	*Chalcostephia flavifrons*
Aethriamanta rezia	*Allocnemis pauli*	*Ceriagrion annulatum*	*Chlorocypha aphrodite*
Africallagma subtile	*Anax chloromelas*	*Ceriagrion bakeri*	*Chlorocypha curta*
Africallagma vaginale	*Anax congoliath*	*Ceriagrion corallinum*	*Chlorocypha trifaria*

FW536: Uele (*continued*)

Species	Species	Species	Species
Chlorocypha victoriae	*Lestes dissimulans*	*Palpopleura deceptor*	*Rhyothemis semihyalina*
Copera nyansana	*Lestes ochraceus*	*Palpopleura jucunda*	*Sapho bicolor*
Crocothemis divisa	*Lestes plagiatus*	*Palpopleura lucia*	*Tetrathemis camerunensis*
Crocothemis erythraea	*Lestes uncifer*	*Palpopleura portia*	*Tetrathemis polleni*
Crocothemis sanguinolenta	*Lestinogomphus congoensis*	*Pantala flavescens*	*Thermochoria equivocata*
Diastatomma selysi	*Malgassophlebia bispina*	*Paragomphus cognatus*	*Tholymis tillarga*
Diplacodes deminuta	*Mesocnemis singularis*	*Paragomphus elpidius*	*Tramea basilaris*
Diplacodes lefebvrii	*Micromacromia camerunica*	*Paragomphus genei*	*Tramea limbata*
Diplacodes luminans	*Neodythemis afra*	*Paragomphus nigroviridis*	*Trithemis aconita*
Elattoneura acuta	*Neodythemis klingi*	*Paragomphus serrulatus*	*Trithemis aenea*
Elattoneura centrafricana	*Neodythemis preussi*	*Parazyxomma flavicans*	*Trithemis annulata*
Elattoneura glauca	*Nesciothemis farinosa*	*Phaon camerunensis*	*Trithemis apicalis*
Elattoneura lliba	*Nesciothemis nigeriensis*	*Phaon iridipennis*	*Trithemis arteriosa*
Elattoneura nigra	*Neurogomphus alius*	*Phyllogomphus annulus*	*Trithemis bredoi*
Elattoneura vittata	*Neurogomphus uelensis*	*Phyllomacromia aureozona*	*Trithemis congolica*
Elattoneura vrijdaghi	*Notiothemis robertsi*	*Phyllomacromia maesi*	*Trithemis dichroa*
Gomphidia bredoi	*Notogomphus leroyi*	*Phyllomacromia melania*	*Trithemis grouti*
Gynacantha africana	*Notogomphus spinosus*	*Phyllomacromia paula*	*Trithemis imitata*
Gynacantha bullata	*Olpogastra lugubris*	*Platycypha lacustris*	*Trithemis kalula*
Gynacantha cylindrata	*Orthetrum abbotti*	*Porpax asperipes*	*Trithemis kirbyi*
Gynacantha manderica	*Orthetrum africanum*	*Porpax bipunctus*	*Trithemis nuptialis*
Gynacantha sextans	*Orthetrum angustiventre*	*Porpax garambensis*	*Trithemis pruinata*
Gynacantha vesiculata	*Orthetrum austeni*	*Porpax sentipes*	*Trithemis stictica*
Hadrothemis camarensis	*Orthetrum brachiale*	*Pseudagrion emarginatum*	*Trithemis tropicana*
Hadrothemis coacta	*Orthetrum guineense*	*Pseudagrion glaucescens*	*Umma longistigma*
Hadrothemis defecta	*Orthetrum hintzi*	*Pseudagrion glaucum*	*Umma saphirina*
Hadrothemis infesta	*Orthetrum icteromelas*	*Pseudagrion hamoni*	*Urothemis assignata*
Hadrothemis versuta	*Orthetrum julia*	*Pseudagrion isidromorai*	*Urothemis edwardsii*
Hadrothemis vrijdaghi	*Orthetrum latihami*	*Pseudagrion kersteni*	*Zygonoides fraseri*
Heliaeschna fuliginosa	*Orthetrum microstigma*	*Pseudagrion kibalense*	*Zygonyx flavicosta*
Heliaeschna sembe	*Orthetrum monardi*	*Pseudagrion melanicterum*	*Zygonyx regisalberti*
Hemistigma albipunctum	*Orthetrum saegeri*	*Pseudagrion serrulatum*	*Zygonyx torridus*
Ictinogomphus ferox	*Orthetrum stemmale*	*Pseudagrion sjoestedti*	*Zyxomma atlanticum*
Ictinogomphus regisalberti	*Orthetrum trinacria*	*Pseudagrion thenartum*	
Idomacromia proavita	*Oxythemis phoenicosceles*	*Rhyothemis fenestrina*	

FW537: Cuvette Centrale (168 species, 1 099 records)

Species	Species	Species	Species
Acisoma trifidum	*Agriocnemis maclachlani*	*Allocnemis pauli*	*Anax ephippiger*
Aethiothemis erythromelas	*Agriocnemis stygia*	*Allocnemis superba*	*Anax imperator*
Aethriamanta rezia	*Allocnemis cyanura*	*Anax chloromelas*	*Anax speratus*
Agriocnemis forcipata	*Allocnemis nigripes*	*Anax congoliath*	*Anax tristis*

FW537: Cuvette Centrale (*continued*)

Species	Species	Species	Species
Atoconeura pseudeudoxia	*Gynacantha cylindrata*	*Orthetrum saegeri*	*Pseudagrion spernatum*
Brachythemis lacustris	*Gynacantha sextans*	*Orthetrum stemmale*	*Rhyothemis fenestrina*
Brachythemis leucosticta	*Gynacantha villosa*	*Oxythemis phoenicosceles*	*Rhyothemis notata*
Bradinopyga strachani	*Hadrothemis camarensis*	*Palpopleura lucia*	*Sapho orichalcea*
Ceriagrion corallinum	*Hadrothemis coacta*	*Palpopleura portia*	*Tetrathemis camerunensis*
Ceriagrion glabrum	*Hadrothemis defecta*	*Pantala flavescens*	*Tetrathemis longfieldae*
Ceriagrion ignitum	*Hadrothemis infesta*	*Paragomphus acuminatus*	*Thermochoria equivocata*
Ceriagrion varians	*Hadrothemis versuta*	*Paragomphus nigroviridis*	*Tholymis tillarga*
Chalcostephia flavifrons	*Hadrothemis vrijdaghi*	*Paragomphus viridior*	*Tramea basilaris*
Chlorocypha aphrodite	*Heliaeschna cynthiae*	*Parazyxomma flavicans*	*Tramea limbata*
Chlorocypha cancellata	*Heliaeschna fuliginosa*	*Phaon camerunensis*	*Trithemis aenea*
Chlorocypha curta	*Heliaeschna sembe*	*Phaon iridipennis*	*Trithemis annulata*
Chlorocypha cyanifrons	*Hemistigma albipunctum*	*Phyllogomphus annulus*	*Trithemis apicalis*
Chlorocypha glauca	*Ictinogomphus regisalberti*	*Phyllogomphus coloratus*	*Trithemis congolica*
Chlorocypha pyriformosa	*Lestes plagiatus*	*Phyllogomphus selysi*	*Trithemis dichroa*
Chlorocypha rubida	*Lestes uncifer*	*Phyllomacromia aureozona*	*Trithemis furva*
Chlorocypha trifaria	*Lestinogomphus angustus*	*Phyllomacromia maesi*	*Trithemis grouti*
Chlorocypha victoriae	*Mesocnemis saralisa*	*Phyllomacromia paula*	*Trithemis hecate*
Copera nyansana	*Mesocnemis singularis*	*Phyllomacromia picta*	*Trithemis imitata*
Crenigomphus hartmanni	*Micromacromia camerunica*	*Platycypha eliseva*	*Trithemis integra*
Crocothemis divisa	*Neodythemis klingi*	*Platycypha lacustris*	*Trithemis longistyla*
Crocothemis erythraea	*Neodythemis preussi*	*Porpax asperipes*	*Trithemis nuptialis*
Crocothemis sanguinolenta	*Nesciothemis farinosa*	*Porpax garambensis*	*Trithemis pruinata*
Cyanothemis simpsoni	*Neurogomphus martininus*	*Porpax sentipes*	*Trithemis stictica*
Diastatomma selysi	*Neurogomphus uelensis*	*Proischnura subfurcata*	*Trithemis tropicana*
Diplacodes deminuta	*Notiothemis robertsi*	*Pseudagrion glaucescens*	*Trithetrum congoense*
Diplacodes lefebvrii	*Olpogastra lugubris*	*Pseudagrion glaucoideum*	*Trithetrum navasi*
Diplacodes luminans	*Orthetrum africanum*	*Pseudagrion glaucum*	*Umma cincta*
Elattoneura acuta	*Orthetrum austeni*	*Pseudagrion hageni*	*Umma longistigma*
Elattoneura centrafricana	*Orthetrum brachiale*	*Pseudagrion kersteni*	*Umma saphirina*
Elattoneura incerta	*Orthetrum caffrum*	*Pseudagrion kibalense*	*Urothemis assignata*
Elattoneura lliba	*Orthetrum camerunense*	*Pseudagrion malagasoides*	*Urothemis edwardsii*
Elattoneura vittata	*Orthetrum chrysostigma*	*Pseudagrion melanicterum*	*Zosteraeschna ellioti*
Elattoneura vrijdaghi	*Orthetrum guineense*	*Pseudagrion nubicum*	*Zygonoides occidentis*
Gomphidia bredoi	*Orthetrum hintzi*	*Pseudagrion rufocinctum*	*Zygonyx eusebia*
Gomphidia quarrei	*Orthetrum julia*	*Pseudagrion serrulatum*	*Zygonyx flavicosta*
Gynacantha africana	*Orthetrum machadoi*	*Pseudagrion simplicilaminatum*	*Zygonyx regisalberti*
Gynacantha bullata	*Orthetrum microstigma*	*Pseudagrion sjoestedti*	*Zyxomma atlanticum*

FW538: Tumba (6 species, 7 records)

Species	Species	Species
Gynacantha cylindrata	*Hemistigma albipunctum*	*Phyllomacromia contumax*
Heliaeschna fuliginosa	*Ictinogomphus regisalberti*	*Trithetrum congoense*

FW539: Upper Congo Rapids (138 species, 735 records)

Species	Species	Species	Species
Aciagrion brosseti	*Elattoneura lliba*	*Orthetrum austeni*	*Pseudagrion nubicum*
Acisoma trifidum	*Elattoneura vittata*	*Orthetrum brachiale*	*Pseudagrion serrulatum*
Aethiothemis erythromelas	*Elattoneura vrijdaghi*	*Orthetrum hintzi*	*Pseudagrion simplicilaminatum*
Aethriamanta rezia	*Gomphidia bredoi*	*Orthetrum icteromelas*	*Pseudagrion sjoestedti*
Agriocnemis forcipata	*Gomphidia quarrei*	*Orthetrum julia*	*Pseudagrion thenartum*
Agriocnemis maclachlani	*Gynacantha africana*	*Orthetrum microstigma*	*Pseudagrion torridum*
Agriocnemis stygia	*Gynacantha bullata*	*Orthetrum saegeri*	*Rhyothemis fenestrina*
Agriocnemis victoria	*Gynacantha cylindrata*	*Orthetrum stemmale*	*Rhyothemis notata*
Allocnemis cyanura	*Gynacantha manderica*	*Orthetrum trinacria*	*Rhyothemis semihyalina*
Allocnemis nigripes	*Gynacantha sextans*	*Oxythemis phoenicosceles*	*Tetrathemis camerunensis*
Allocnemis superba	*Hadrothemis camarensis*	*Palpopleura albifrons*	*Thermochoria equivocata*
Anax imperator	*Hadrothemis coacta*	*Palpopleura lucia*	*Tholymis tillarga*
Anax speratus	*Hadrothemis defecta*	*Palpopleura portia*	*Trithemis aenea*
Anax tristis	*Hadrothemis infesta*	*Pantala flavescens*	*Trithemis annulata*
Brachythemis lacustris	*Hadrothemis versuta*	*Paragomphus acuminatus*	*Trithemis apicalis*
Brachythemis leucosticta	*Hadrothemis vrijdaghi*	*Paragomphus nigroviridis*	*Trithemis arteriosa*
Bradinopyga strachani	*Heliaeschna cynthiae*	*Parazyxomma flavicans*	*Trithemis congolica*
Ceriagrion corallinum	*Heliaeschna fuliginosa*	*Phaon camerunensis*	*Trithemis dichroa*
Ceriagrion glabrum	*Heliaeschna sembe*	*Phaon iridipennis*	*Trithemis grouti*
Ceriagrion ignitum	*Hemistigma albipunctum*	*Phyllogomphus annulus*	*Trithemis longistyla*
Ceriagrion varians	*Ictinogomphus regisalberti*	*Phyllogomphus selysi*	*Trithemis nuptialis*
Ceriagrion whellani	*Lestes dissimulans*	*Phyllomacromia aureozona*	*Trithemis tropicana*
Chalcostephia flavifrons	*Lestinogomphus congoensis*	*Phyllomacromia contumax*	*Trithetrum congoense*
Chlorocypha aphrodite	*Malgassophlebia bispina*	*Phyllomacromia maesi*	*Trithetrum navasi*
Chlorocypha cancellata	*Mesocnemis singularis*	*Phyllomacromia paula*	*Umma cincta*
Chlorocypha trifaria	*Micromacromia camerunica*	*Platycypha eliseva*	*Umma longistigma*
Chlorocypha victoriae	*Neodythemis klingi*	*Platycypha picta*	*Umma saphirina*
Copera nyansana	*Neodythemis preussi*	*Porpax garambensis*	*Urothemis assignata*
Cyanothemis simpsoni	*Neophya rutherfordi*	*Porpax sentipes*	*Urothemis edwardsii*
Diastatomma multilineatum	*Nesciothemis farinosa*	*Pseudagrion glaucoideum*	*Zygonoides occidentis*
Diastatomma selysi	*Neurogomphus martininus*	*Pseudagrion glaucum*	*Zygonyx flavicosta*
Diplacodes deminuta	*Notiothemis robertsi*	*Pseudagrion hageni*	*Zygonyx regisalberti*
Diplacodes lefebvrii	*Olpogastra lugubris*	*Pseudagrion kibalense*	*Zyxomma atlanticum*
Diplacodes luminans	*Orthetrum abbotti*	*Pseudagrion malagasoides*	
Elattoneura centrafricana	*Orthetrum africanum*	*Pseudagrion melanicterum*	

FW540: Upper Congo (136 species, 402 records)

Species	Species	Species	Species
Aciagrion brosseti	*Elattoneura lliba*	*Orthetrum microstigma*	*Pseudagrion simplicilaminatum*
Acisoma trifidum	*Elattoneura morini*	*Orthetrum saegeri*	*Pseudagrion sublacteum*
Aethiothemis ellioti	*Elattoneura vittata*	*Orthetrum stemmale*	*Pseudagrion thenartum*
Aethiothemis erythromelas	*Gynacantha bullata*	*Palpopleura albifrons*	*Rhyothemis fenestrina*
Aethiothemis solitaria	*Gynacantha cylindrata*	*Palpopleura lucia*	*Rhyothemis mariposa*
Aethriamanta rezia	*Gynacantha manderica*	*Palpopleura portia*	*Rhyothemis semihyalina*
Agriocnemis forcipata	*Gynacantha sextans*	*Pantala flavescens*	*Thermochoria equivocata*
Agriocnemis maclachlani	*Hadrothemis coacta*	*Paragomphus acuminatus*	*Tholymis tillarga*
Agriocnemis stygia	*Hadrothemis defecta*	*Paragomphus cognatus*	*Tramea basilaris*
Agriocnemis victoria	*Hadrothemis infesta*	*Paragomphus genei*	*Trithemis aenea*
Allocnemis cyanura	*Hadrothemis versuta*	*Paragomphus machadoi*	*Trithemis annulata*
Allocnemis nigripes	*Hadrothemis vrijdaghi*	*Parazyxomma flavicans*	*Trithemis apicalis*
Allocnemis superba	*Heliaeschna cynthiae*	*Phaon camerunensis*	*Trithemis arteriosa*
Anax ephippiger	*Heliaeschna fuliginosa*	*Phaon iridipennis*	*Trithemis congolica*
Anax speratus	*Heliaeschna sembe*	*Phyllogomphus annulus*	*Trithemis dichroa*
Anax tristis	*Hemistigma albipunctum*	*Phyllogomphus selysi*	*Trithemis dorsalis*
Brachythemis lacustris	*Ictinogomphus regisalberti*	*Phyllomacromia aureozona*	*Trithemis grouti*
Ceriagrion corallinum	*Lestes amicus*	*Phyllomacromia contumax*	*Trithemis hartwigi*
Ceriagrion glabrum	*Lestes ictericus*	*Platycypha caligata*	*Trithemis imitata*
Ceriagrion platystigma	*Libyogomphus tenaculatus*	*Porpax asperipes*	*Trithemis nuptialis*
Ceriagrion suave	*Malgassophlebia bispina*	*Porpax garambensis*	*Trithemis pluvialis*
Ceriagrion tricrenaticeps	*Micromacromia camerunica*	*Porpax risi*	*Trithemis pruinata*
Chalcostephia flavifrons	*Neodythemis klingi*	*Porpax sentipes*	*Trithemis stictica*
Chlorocypha aphrodite	*Neodythemis preussi*	*Pseudagrion acaciae*	*Trithetrum navasi*
Chlorocypha consueta	*Notiothemis robertsi*	*Pseudagrion glaucescens*	*Umma cincta*
Chlorocypha trifaria	*Olpogastra lugubris*	*Pseudagrion glaucoideum*	*Umma longistigma*
Copera nyansana	*Orthetrum abbotti*	*Pseudagrion glaucum*	*Umma saphirina*
Crocothemis erythraea	*Orthetrum africanum*	*Pseudagrion hageni*	*Urothemis assignata*
Crocothemis sanguinolenta	*Orthetrum austeni*	*Pseudagrion isidromorai*	*Urothemis edwardsii*
Cyanothemis simpsoni	*Orthetrum brachiale*	*Pseudagrion kersteni*	*Zygonyx atritibiae*
Diastatomma selysi	*Orthetrum guineense*	*Pseudagrion kibalense*	*Zygonyx flavicosta*
Diastatomma soror	*Orthetrum hintzi*	*Pseudagrion melanicterum*	*Zygonyx regisalberti*
Diplacodes lefebvrii	*Orthetrum julia*	*Pseudagrion nubicum*	*Zygonyx torridus*
Elattoneura centrafricana	*Orthetrum machadoi*	*Pseudagrion serrulatum*	*Zyxomma atlanticum*

FW541: Albertine Highlands (39 species, 54 records)

Species	Species	Species	Species
Africallagma pseudelongatum	*Chlorocypha glauca*	*Neodythemis klingi*	*Pantala flavescens*
Allocnemis nigripes	*Chlorocypha trifaria*	*Orthetrum austeni*	*Paragomphus viridior*
Anax imperator	*Gynacantha cylindrata*	*Orthetrum julia*	*Phyllomacromia contumax*
Ceriagrion glabrum	*Hadrothemis versuta*	*Orthetrum microstigma*	*Platycypha caligata*
Chlorocypha cancellata	*Malgassophlebia bispina*	*Palpopleura portia*	*Platycypha lacustris*

FW541: Albertine Highlands (*continued*)

Species	Species	Species	Species
Porpax garambensis	*Pseudagrion kersteni*	*Stenocypha jacksoni*	*Trithemis stictica*
Proischnura subfurcata	*Pseudagrion massaicum*	*Stenocypha molindica*	*Trithemis tropicana*
Pseudagrion hageni	*Pseudagrion melanicterum*	*Tetrathemis camerunensis*	*Umma longistigma*
Pseudagrion hamoni	*Pseudagrion rufocinctum*	*Trithemis arteriosa*	*Umma saphirina*
Pseudagrion isidromorai	*Pseudagrion spernatum*	*Trithemis nuptialis*	

FW542: Lake Tanganyika (165 species, 1 004 records)

Species	Species	Species	Species
Aciagrion africanum	*Chalcostephia flavifrons*	*Lestes uncifer*	*Paragomphus cognatus*
Aciagrion steeleae	*Chlorocypha consueta*	*Lestes virgatus*	*Paragomphus genei*
Acisoma trifidum	*Chlorocypha fabamacula*	*Mesocnemis singularis*	*Paragomphus viridior*
Aethiothemis bequaerti	*Chlorocypha trifaria*	*Neodythemis fitzgeraldi*	*Phaon iridipennis*
Aethiothemis solitaria	*Copera nyansana*	*Nesciothemis farinosa*	*Phyllogomphus selysi*
Aethriamanta rezia	*Crenigomphus hartmanni*	*Nesciothemis fitzgeraldi*	*Phyllomacromia contumax*
Africallagma sinuatum	*Crocothemis brevistigma*	*Notiothemis jonesi*	*Phyllomacromia melania*
Africallagma subtile	*Crocothemis divisa*	*Notiothemis robertsi*	*Phyllomacromia monoceros*
Africallagma vaginale	*Crocothemis erythraea*	*Notogomphus praetorius*	*Phyllomacromia picta*
Afroaeschna scotias	*Crocothemis sanguinolenta*	*Olpogastra lugubris*	*Phyllomacromia sylvatica*
Agriocnemis exilis	*Diastatomma soror*	*Onychogomphus seydeli*	*Pinheyagrion angolicum*
Agriocnemis gratiosa	*Diplacodes deminuta*	*Onychogomphus styx*	*Pinheyschna rileyi*
Agriocnemis pinheyi	*Diplacodes lefebvrii*	*Orthetrum abbotti*	*Platycypha caligata*
Agriocnemis victoria	*Diplacodes luminans*	*Orthetrum austeni*	*Platycypha lacustris*
Allocnemis superba	*Diplacodes pumila*	*Orthetrum brachiale*	*Platycypha pinheyi*
Anaciaeschna triangulifera	*Elattoneura cellularis*	*Orthetrum caffrum*	*Pseudagrion acaciae*
Anax chloromelas	*Elattoneura glauca*	*Orthetrum chrysostigma*	*Pseudagrion assegaii*
Anax ephippiger	*Eleuthemis quadrigutta*	*Orthetrum guineense*	*Pseudagrion deningi*
Anax imperator	*Gynacantha bullata*	*Orthetrum hintzi*	*Pseudagrion fisheri*
Anax speratus	*Gynacantha manderica*	*Orthetrum icteromelas*	*Pseudagrion glaucescens*
Anax tristis	*Gynacantha vesiculata*	*Orthetrum julia*	*Pseudagrion hageni*
Atoconeura biordinata	*Hadrothemis scabrifrons*	*Orthetrum machadoi*	*Pseudagrion hamoni*
Atoconeura eudoxia	*Hemicordulia africana*	*Orthetrum macrostigma*	*Pseudagrion helenae*
Azuragrion nigridorsum	*Hemistigma albipunctum*	*Orthetrum monardi*	*Pseudagrion inconspicuum*
Brachythemis lacustris	*Ictinogomphus ferox*	*Orthetrum robustum*	*Pseudagrion kersteni*
Brachythemis leucosticta	*Ictinogomphus regisalberti*	*Orthetrum stemmale*	*Pseudagrion lindicum*
Bradinopyga cornuta	*Ischnura senegalensis*	*Orthetrum trinacria*	*Pseudagrion makabusiense*
Ceriagrion corallinum	*Lestes amicus*	*Palpopleura deceptor*	*Pseudagrion melanicterum*
Ceriagrion glabrum	*Lestes pallidus*	*Palpopleura jucunda*	*Pseudagrion nubicum*
Ceriagrion suave	*Lestes pinheyi*	*Palpopleura lucia*	*Pseudagrion rufocinctum*
Ceriagrion varians	*Lestes plagiatus*	*Palpopleura portia*	*Pseudagrion salisburyense*
Ceriagrion whellani	*Lestes tridens*	*Pantala flavescens*	*Pseudagrion sjoestedti*

FW542: Lake Tanganyika (*continued*)

Species	Species	Species	Species
Pseudagrion spernatum	*Tramea basilaris*	*Trithemis hecate*	*Umma electa*
Pseudagrion sublacteum	*Trithemis aconita*	*Trithemis integra*	*Urothemis assignata*
Pseudagrion sudanicum	*Trithemis annulata*	*Trithemis kirbyi*	*Urothemis edwardsii*
Rhyothemis fenestrina	*Trithemis anomala*	*Trithemis leakeyi*	*Zygonyx atritibiae*
Rhyothemis mariposa	*Trithemis arteriosa*	*Trithemis monardi*	*Zygonyx natalensis*
Rhyothemis semihyalina	*Trithemis dichroa*	*Trithemis nuptialis*	*Zygonyx regisalberti*
Stenocypha tenuis	*Trithemis donaldsoni*	*Trithemis pluvialis*	*Zygonyx torridus*
Tetrathemis polleni	*Trithemis dorsalis*	*Trithemis pruinata*	
Thermochoria jeanneli	*Trithemis furva*	*Trithemis stictica*	
Tholymis tillarga	*Trithemis grouti*	*Trithemis werneri*	

FW543: Malagarasi – Moyowosi (22 species, 24 records)

Species	Species	Species	Species
Anax imperator	*Mesocnemis singularis*	*Pseudagrion nubicum*	*Trithemis kirbyi*
Brachythemis leucosticta	*Olpogastra lugubris*	*Pseudagrion sublacteum*	*Trithemis pruinata*
Ceriagrion glabrum	*Orthetrum brachiale*	*Rhyothemis semihyalina*	*Urothemis assignata*
Crocothemis erythraea	*Palpopleura lucia*	*Tramea basilaris*	*Urothemis edwardsii*
Hemistigma albipunctum	*Phyllomacromia contumax*	*Trithemis arteriosa*	
Ictinogomphus ferox	*Platycypha caligata*	*Trithemis integra*	

FW544: Bangweulu – Mweru (193 species, 2 996 records)

Species	Species	Species	Species
Aciagrion africanum	*Afroaeschna scotias*	*Azuragrion nigridorsum*	*Crocothemis erythraea*
Aciagrion gracile	*Agriocnemis exilis*	*Brachythemis lacustris*	*Crocothemis sanguinolenta*
Aciagrion heterostictum	*Agriocnemis gratiosa*	*Brachythemis leucosticta*	*Diastatomma selysi*
Aciagrion nodosum	*Agriocnemis pinheyi*	*Bradinopyga cornuta*	*Diastatomma soror*
Aciagrion steeleae	*Agriocnemis ruberrima*	*Ceriagrion corallinum*	*Diplacodes deminuta*
Acisoma trifidum	*Agriocnemis victoria*	*Ceriagrion glabrum*	*Diplacodes lefebvrii*
Aethiothemis bequaerti	*Allocnemis marshalli*	*Ceriagrion sakejii*	*Diplacodes luminans*
Aethiothemis ellioti	*Allocnemis mitwabae*	*Ceriagrion suave*	*Diplacodes pumila*
Aethiothemis solitaria	*Allocnemis wittei*	*Ceriagrion whellani*	*Elattoneura cellularis*
Aethriamanta rezia	*Anaciaeschna triangulifera*	*Chalcostephia flavifrons*	*Elattoneura glauca*
Africallagma fractum	*Anax bangweuluensis*	*Chlorocypha consueta*	*Eleuthemis quadrigutta*
Africallagma glaucum	*Anax ephippiger*	*Chlorocypha fabamacula*	*Gomphidia quarrei*
Africallagma pseudelongatum	*Anax imperator*	*Chlorocypha wittei*	*Gynacantha immaculifrons*
Africallagma sinuatum	*Anax speratus*	*Crenigomphus cornutus*	*Gynacantha manderica*
Africallagma subtile	*Anax tristis*	*Crocothemis brevistigma*	*Gynacantha nigeriensis*
Africallagma vaginale	*Atoconeura biordinata*	*Crocothemis divisa*	*Gynacantha sextans*

FW544: Bangweulu – Mweru (*continued*)

Species	Species	Species	Species
Gynacantha vesiculata	*Orthetrum brachiale*	*Porpax asperipes*	*Tholymis tillarga*
Gynacantha villosa	*Orthetrum caffrum*	*Porpax risi*	*Tramea basilaris*
Hadrothemis defecta	*Orthetrum chrysostigma*	*Pseudagrion acaciae*	*Trithemis aconita*
Hadrothemis scabrifrons	*Orthetrum guineense*	*Pseudagrion assegaii*	*Trithemis aequalis*
Hadrothemis versuta	*Orthetrum hintzi*	*Pseudagrion coeleste*	*Trithemis annulata*
Heliaeschna cynthiae	*Orthetrum icteromelas*	*Pseudagrion coeruleipunctum*	*Trithemis anomala*
Heliaeschna ugandica	*Orthetrum julia*	*Pseudagrion deningi*	*Trithemis arteriosa*
Hemistigma albipunctum	*Orthetrum machadoi*	*Pseudagrion fisheri*	*Trithemis bifida*
Ictinogomphus dundoensis	*Orthetrum microstigma*	*Pseudagrion gamblesi*	*Trithemis dichroa*
Ictinogomphus ferox	*Orthetrum monardi*	*Pseudagrion glaucescens*	*Trithemis dorsalis*
Ictinogomphus regisalberti	*Orthetrum saegeri*	*Pseudagrion glaucoideum*	*Trithemis furva*
Ischnura senegalensis	*Orthetrum stemmale*	*Pseudagrion greeni*	*Trithemis grouti*
Lestes amicus	*Orthetrum trinacria*	*Pseudagrion hageni*	*Trithemis hecate*
Lestes dissimulans	*Palpopleura albifrons*	*Pseudagrion hamoni*	*Trithemis kirbyi*
Lestes ochraceus	*Palpopleura deceptor*	*Pseudagrion helenae*	*Trithemis leakeyi*
Lestes pallidus	*Palpopleura jucunda*	*Pseudagrion inconspicuum*	*Trithemis monardi*
Lestes pinheyi	*Palpopleura lucia*	*Pseudagrion kersteni*	*Trithemis nuptialis*
Lestes plagiatus	*Palpopleura portia*	*Pseudagrion kibalense*	*Trithemis palustris*
Lestes tridens	*Pantala flavescens*	*Pseudagrion makabusiense*	*Trithemis pluvialis*
Lestes uncifer	*Paragomphus cognatus*	*Pseudagrion massaicum*	*Trithemis pruinata*
Lestes virgatus	*Paragomphus genei*	*Pseudagrion melanicterum*	*Trithemis stictica*
Lestinogomphus angustus	*Parazyxomma flavicans*	*Pseudagrion nubicum*	*Trithetrum navasi*
Mesocnemis singularis	*Phaon iridipennis*	*Pseudagrion rufostigma*	*Umma electa*
Microgomphus nyassicus	*Phyllogomphus selysi*	*Pseudagrion salisburyense*	*Urothemis assignata*
Neodythemis fitzgeraldi	*Phyllomacromia contumax*	*Pseudagrion sjoestedti*	*Urothemis edwardsii*
Neodythemis klingi	*Phyllomacromia melania*	*Pseudagrion spernatum*	*Zygonoides fuelleborni*
Nesciothemis farinosa	*Phyllomacromia monoceros*	*Pseudagrion sublacteum*	*Zygonyx atritibiae*
Nesciothemis fitzgeraldi	*Phyllomacromia picta*	*Pseudagrion sudanicum*	*Zygonyx flavicosta*
Notiothemis robertsi	*Phyllomacromia unifasciata*	*Pseudagrion symoensii*	*Zygonyx natalensis*
Notogomphus praetorius	*Pinheyagrion angolicum*	*Rhyothemis fenestrina*	*Zygonyx torridus*
Olpogastra lugubris	*Pinheyschna rileyi*	*Rhyothemis mariposa*	
Onychogomphus seydeli	*Platycypha caligata*	*Rhyothemis semihyalina*	
Orthetrum abbotti	*Platycypha lacustris*	*Thermochoria jeanneli*	

FW545: Upper Lualaba (180 species, 1 024 records)

Species	Species	Species	Species
Aciagrion africanum	*Aethiothemis ellioti*	*Africallagma pseudelongatum*	*Agriocnemis exilis*
Aciagrion nodosum	*Aethiothemis solitaria*	*Africallagma sinuatum*	*Agriocnemis gratiosa*
Aciagrion steeleae	*Aethriamanta rezia*	*Africallagma subtile*	*Agriocnemis pinheyi*
Acisoma trifidum	*Africallagma fractum*	*Africallagma vaginale*	*Agriocnemis victoria*
Aethiothemis bequaerti	*Africallagma glaucum*	*Afroaeschna scotias*	*Allocnemis mitwabae*

FW545: Upper Lualaba (*continued*)

Species	Species	Species	Species
Allocnemis nigripes	*Gynacantha vesiculata*	*Orthetrum macrostigma*	*Pseudagrion melanicterum*
Allocnemis wittei	*Hadrothemis camarensis*	*Orthetrum microstigma*	*Pseudagrion nubicum*
Anax chloromelas	*Hadrothemis defecta*	*Orthetrum monardi*	*Pseudagrion salisburyense*
Anax ephippiger	*Heliaeschna fuliginosa*	*Orthetrum robustum*	*Pseudagrion spernatum*
Anax imperator	*Hemistigma albipunctum*	*Orthetrum stemmale*	*Pseudagrion sublacteum*
Anax speratus	*Ictinogomphus ferox*	*Orthetrum trinacria*	*Pseudagrion symoensii*
Anax tristis	*Ictinogomphus regisalberti*	*Palpopleura albifrons*	*Rhyothemis fenestrina*
Atoconeura biordinata	*Ischnura senegalensis*	*Palpopleura deceptor*	*Rhyothemis mariposa*
Atoconeura pseudeudoxia	*Lestes amicus*	*Palpopleura jucunda*	*Rhyothemis semihyalina*
Brachythemis lacustris	*Lestes dissimulans*	*Palpopleura lucia*	*Thermochoria jeanneli*
Brachythemis leucosticta	*Lestes ictericus*	*Palpopleura portia*	*Tholymis tillarga*
Bradinopyga cornuta	*Lestes ochraceus*	*Pantala flavescens*	*Tramea basilaris*
Bradinopyga strachani	*Lestes pallidus*	*Paragomphus elpidius*	*Trithemis aconita*
Ceriagrion bakeri	*Lestes pinheyi*	*Paragomphus genei*	*Trithemis aenea*
Ceriagrion corallinum	*Lestes plagiatus*	*Parazyxomma flavicans*	*Trithemis annulata*
Ceriagrion glabrum	*Lestes tridens*	*Phaon iridipennis*	*Trithemis anomala*
Ceriagrion platystigma	*Lestes uncifer*	*Phyllogomphus selysi*	*Trithemis arteriosa*
Ceriagrion suave	*Lestes virgatus*	*Phyllomacromia aureozona*	*Trithemis bifida*
Ceriagrion whellani	*Mesocnemis saralisa*	*Phyllomacromia contumax*	*Trithemis congolica*
Chalcostephia flavifrons	*Mesocnemis singularis*	*Phyllomacromia maesi*	*Trithemis dichroa*
Chlorocypha consueta	*Neodythemis fitzgeraldi*	*Phyllomacromia melania*	*Trithemis dorsalis*
Chlorocypha fabamacula	*Neodythemis preussi*	*Phyllomacromia monoceros*	*Trithemis furva*
Chlorocypha frigida	*Nesciothemis farinosa*	*Phyllomacromia picta*	*Trithemis kirbyi*
Chlorocypha wittei	*Nesciothemis fitzgeraldi*	*Phyllomacromia sylvatica*	*Trithemis leakeyi*
Crenigomphus cornutus	*Neurogomphus cocytius*	*Phyllomacromia unifasciata*	*Trithemis monardi*
Crocothemis brevistigma	*Notiothemis robertsi*	*Pinheyschna meruensis*	*Trithemis nuptialis*
Crocothemis divisa	*Notogomphus leroyi*	*Pinheyschna rileyi*	*Trithemis pluvialis*
Crocothemis erythraea	*Notogomphus praetorius*	*Platycypha caligata*	*Trithemis pruinata*
Crocothemis sanguinolenta	*Olpogastra lugubris*	*Platycypha lacustris*	*Trithemis stictica*
Diastatomma selysi	*Onychogomphus seydeli*	*Porpax risi*	*Trithemis tropicana*
Diastatomma soror	*Orthetrum abbotti*	*Pseudagrion acaciae*	*Trithetrum navasi*
Diplacodes lefebvrii	*Orthetrum angustiventre*	*Pseudagrion gamblesi*	*Umma electa*
Diplacodes luminans	*Orthetrum brachiale*	*Pseudagrion glaucescens*	*Urothemis assignata*
Diplacodes pumila	*Orthetrum caffrum*	*Pseudagrion hageni*	*Urothemis edwardsii*
Elattoneura cellularis	*Orthetrum chrysostigma*	*Pseudagrion hamoni*	*Zygonoides fuelleborni*
Elattoneura glauca	*Orthetrum guineense*	*Pseudagrion inconspicuum*	*Zygonyx atritibiae*
Eleuthemis quadrigutta	*Orthetrum hintzi*	*Pseudagrion kersteni*	*Zygonyx eusebia*
Gomphidia quarrei	*Orthetrum icteromelas*	*Pseudagrion kibalense*	*Zygonyx flavicosta*
Gynacantha cylindrata	*Orthetrum julia*	*Pseudagrion makabusiense*	*Zygonyx natalensis*
Gynacantha manderica	*Orthetrum machadoi*	*Pseudagrion massaicum*	*Zygonyx torridus*

FW546: Kasai (132 species, 472 records)

Species	Species	Species	Species
Acisoma trifidum	*Diplacodes lefebvrii*	*Orthetrum chrysostigma*	*Pseudagrion kersteni*
Aethiothemis bequaerti	*Diplacodes luminans*	*Orthetrum guineense*	*Pseudagrion kibalense*
Aethiothemis ellioti	*Elattoneura centrafricana*	*Orthetrum hintzi*	*Pseudagrion melanicterum*
Aethiothemis solitaria	*Elattoneura glauca*	*Orthetrum icteromelas*	*Pseudagrion spernatum*
Aethriamanta rezia	*Elattoneura lliba*	*Orthetrum julia*	*Rhyothemis fenestrina*
Afroaeschna scotias	*Elattoneura morini*	*Orthetrum machadoi*	*Rhyothemis mariposa*
Agriocnemis exilis	*Gomphidia quarrei*	*Orthetrum macrostigma*	*Rhyothemis semihyalina*
Agriocnemis forcipata	*Gynacantha bullata*	*Orthetrum microstigma*	*Tetrathemis camerunensis*
Allocnemis nigripes	*Gynacantha cylindrata*	*Orthetrum monardi*	*Thermochoria equivocata*
Anax ephippiger	*Gynacantha sextans*	*Orthetrum saegeri*	*Tholymis tillarga*
Anax imperator	*Gynacantha vesiculata*	*Orthetrum stemmale*	*Tramea basilaris*
Anax speratus	*Hadrothemis camarensis*	*Orthetrum trinacria*	*Trithemis aenea*
Anax tristis	*Hadrothemis coacta*	*Oxythemis phoenicosceles*	*Trithemis annulata*
Azuragrion nigridorsum	*Hadrothemis defecta*	*Palpopleura albifrons*	*Trithemis arteriosa*
Brachythemis lacustris	*Hadrothemis infesta*	*Palpopleura jucunda*	*Trithemis congolica*
Brachythemis leucosticta	*Hadrothemis scabrifrons*	*Palpopleura lucia*	*Trithemis dichroa*
Ceriagrion corallinum	*Hadrothemis versuta*	*Palpopleura portia*	*Trithemis furva*
Ceriagrion glabrum	*Heliaeschna sembe*	*Pantala flavescens*	*Trithemis nuptialis*
Ceriagrion tricrenaticeps	*Hemistigma albipunctum*	*Paragomphus cognatus*	*Trithemis pruinata*
Ceriagrion varians	*Ictinogomphus regisalberti*	*Phaon camerunensis*	*Trithemis stictica*
Chalcostephia flavifrons	*Lestes amicus*	*Phaon iridipennis*	*Trithemis tropicana*
Chlorocypha cyanifrons	*Lestinogomphus congoensis*	*Phyllogomphus annulus*	*Umma cincta*
Chlorocypha fabamacula	*Micromacromia camerunica*	*Phyllogomphus selysi*	*Umma electa*
Chlorocypha frigida	*Neodythemis preussi*	*Phyllomacromia aureozona*	*Umma longistigma*
Chlorocypha trifaria	*Neophya rutherfordi*	*Phyllomacromia melania*	*Umma saphirina*
Copera nyansana	*Nesciothemis farinosa*	*Phyllomacromia paula*	*Urothemis assignata*
Crocothemis divisa	*Notogomphus leroyi*	*Phyllomacromia unifasciata*	*Zygonoides occidentis*
Crocothemis erythraea	*Notogomphus praetorius*	*Platycypha caligata*	*Zygonyx eusebia*
Crocothemis sanguinolenta	*Olpogastra lugubris*	*Platycypha lacustris*	*Zygonyx flavicosta*
Cyanothemis simpsoni	*Orthetrum abbotti*	*Porpax asperipes*	*Zygonyx natalensis*
Diastatomma selysi	*Orthetrum austeni*	*Pseudagrion angolense*	*Zygonyx regisalberti*
Diastatomma soror	*Orthetrum brachiale*	*Pseudagrion glaucescens*	*Zygonyx torridus*
Diplacodes deminuta	*Orthetrum caffrum*	*Pseudagrion hageni*	*Zyxomma atlanticum*

FW547: Mai Ndombe (16 species, 24 records)

Species	Species	Species	Species
Acisoma trifidum	*Hadrothemis infesta*	*Orthetrum microstigma*	*Rhyothemis fenestrina*
Aethiothemis erythromelas	*Hadrothemis versuta*	*Orthetrum stemmale*	*Thermochoria equivocata*
Chalcostephia flavifrons	*Hemistigma albipunctum*	*Palpopleura lucia*	*Trithemis aenea*
Gynacantha sextans	*Orthetrum julia*	*Phyllomacromia maesi*	*Umma cincta*

FW548: Malebo Pool (23 species, 51 records)

Species	Species	Species	Species
Acisoma trifidum	*Chalcostephia flavifrons*	*Orthetrum africanum*	*Trithemis aenea*
Aethiothemis solitaria	*Chlorocypha aphrodite*	*Orthetrum microstigma*	*Trithemis arteriosa*
Aethriamanta rezia	*Elattoneura vrijdaghi*	*Platycypha picta*	*Urothemis edwardsii*
Agriocnemis forcipata	*Hadrothemis defecta*	*Pseudagrion bernardi*	*Zygonyx regisalberti*
Brachythemis lacustris	*Lestes tridens*	*Pseudagrion glaucescens*	*Zygonyx torridus*
Ceriagrion glabrum	*Orthetrum abbotti*	*Pseudagrion simplicilaminatum*	

FW549: Lower Congo Rapids (85 species, 344 records)

Species	Species	Species	Species
Acisoma trifidum	*Crocothemis sanguinolenta*	*Orthetrum chrysostigma*	*Pseudagrion serrulatum*
Aethiothemis mediofasciata	*Diplacodes lefebvrii*	*Orthetrum guineense*	*Pseudagrion simplicilaminatum*
Aethriamanta rezia	*Diplacodes luminans*	*Orthetrum hintzi*	*Pseudagrion sublacteum*
Agriocnemis forcipata	*Elattoneura glauca*	*Orthetrum icteromelas*	*Rhyothemis fenestrina*
Agriocnemis maclachlani	*Elattoneura incerta*	*Orthetrum julia*	*Rhyothemis notata*
Agriocnemis victoria	*Elattoneura lliba*	*Orthetrum microstigma*	*Sapho orichalcea*
Allocnemis nigripes	*Elattoneura morini*	*Orthetrum stemmale*	*Stenocypha gracilis*
Anax imperator	*Gynacantha bullata*	*Oxythemis phoenicosceles*	*Tramea basilaris*
Brachythemis leucosticta	*Gynacantha cylindrata*	*Palpopleura lucia*	*Trithemis aenea*
Bradinopyga strachani	*Gynacantha vesiculata*	*Palpopleura portia*	*Trithemis arteriosa*
Ceriagrion annulatum	*Hadrothemis defecta*	*Pantala flavescens*	*Trithemis grouti*
Ceriagrion corallinum	*Heliaeschna fuliginosa*	*Phaon iridipennis*	*Trithemis nuptialis*
Ceriagrion glabrum	*Heliaeschna ugandica*	*Phyllogomphus coloratus*	*Urothemis edwardsii*
Ceriagrion whellani	*Hemistigma albipunctum*	*Phyllomacromia aureozona*	*Zygonoides occidentis*
Chalcostephia flavifrons	*Mesocnemis singularis*	*Phyllomacromia melania*	*Zygonyx eusebia*
Chlorocypha cancellata	*Micromacromia camerunica*	*Platycypha picta*	*Zygonyx flavicosta*
Chlorocypha curta	*Neodythemis klingi*	*Porpax asperipes*	*Zygonyx regisalberti*
Chlorocypha cyanifrons	*Notiothemis robertsi*	*Pseudagrion bernardi*	*Zygonyx torridus*
Chlorocypha rubida	*Orthetrum abbotti*	*Pseudagrion glaucescens*	*Zyxomma atlanticum*
Copera congolensis	*Orthetrum africanum*	*Pseudagrion hamoni*	
Crocothemis divisa	*Orthetrum austeni*	*Pseudagrion kibalense*	
Crocothemis erythraea	*Orthetrum brachiale*	*Pseudagrion melanicterum*	

FW550: Lower Congo (53 species, 70 records)

Species	Species	Species	Species
Acisoma trifidum	*Ceriagrion glabrum*	*Diplacodes deminuta*	*Gynacantha cylindrata*
Aethriamanta rezia	*Chalcostephia flavifrons*	*Diplacodes lefebvrii*	*Hadrothemis defecta*
Allocnemis nigripes	*Crocothemis erythraea*	*Diplacodes luminans*	*Hadrothemis versuta*
Bradinopyga strachani	*Crocothemis sanguinolenta*	*Gynacantha bullata*	*Heliaeschna fuliginosa*

FW550: Lower Congo (*continued*)

Species	Species	Species	Species
Hemistigma albipunctum	*Palpopleura albifrons*	*Pseudagrion salisburyense*	*Trithemis hartwigi*
Micromacromia camerunica	*Palpopleura lucia*	*Pseudagrion simonae*	*Trithemis nuptialis*
Neodythemis klingi	*Palpopleura portia*	*Rhyothemis fenestrina*	*Trithemis pruinata*
Notogomphus spinosus	*Pantala flavescens*	*Rhyothemis semihyalina*	*Umma electa*
Orthetrum austeni	*Phaon iridipennis*	*Sapho gloriosa*	*Umma longistigma*
Orthetrum guineense	*Phyllogomphus selysi*	*Sapho orichalcea*	*Umma saphirina*
Orthetrum hintzi	*Phyllomacromia aureozona*	*Tramea basilaris*	*Zyxomma atlanticum*
Orthetrum julia	*Platycypha lacustris*	*Trithemis apicalis*	
Orthetrum microstigma	*Pseudagrion estesi*	*Trithemis arteriosa*	
Orthetrum stemmale	*Pseudagrion kersteni*	*Trithemis dichroa*	

FW551: Cuanza (155 species, 1 092 records)

Species	Species	Species	Species
Aciagrion africanum	*Ceriagrion glabrum*	*Lestes dissimulans*	*Orthetrum robustum*
Aciagrion nodosum	*Ceriagrion platystigma*	*Lestes pallidus*	*Orthetrum saegeri*
Acisoma inflatum	*Ceriagrion sakejii*	*Lestes plagiatus*	*Orthetrum stemmale*
Acisoma trifidum	*Ceriagrion whellani*	*Lestes tridens*	*Orthetrum trinacria*
Aethiothemis bequaerti	*Chalcostephia flavifrons*	*Libyogomphus tenaculatus*	*Oxythemis phoenicosceles*
Aethiothemis ellioti	*Chlorocypha cancellata*	*Malgassophlebia bispina*	*Palpopleura albifrons*
Aethiothemis solitaria	*Chlorocypha crocea*	*Micromacromia camerunica*	*Palpopleura deceptor*
Aethriamanta rezia	*Chlorocypha curta*	*Neodythemis afra*	*Palpopleura jucunda*
Africallagma fractum	*Chlorocypha cyanifrons*	*Neodythemis klingi*	*Palpopleura lucia*
Africallagma glaucum	*Chlorocypha fabamacula*	*Nesciothemis farinosa*	*Palpopleura portia*
Africallagma vaginale	*Chlorocypha victoriae*	*Nesciothemis fitzgeraldi*	*Pantala flavescens*
Afroaeschna scotias	*Copera congolensis*	*Neurogomphus alius*	*Paragomphus cognatus*
Agriocnemis angolensis	*Crenigomphus cornutus*	*Notiothemis robertsi*	*Paragomphus genei*
Agriocnemis exilis	*Crocothemis erythraea*	*Notogomphus praetorius*	*Phaon camerunensis*
Agriocnemis forcipata	*Crocothemis sanguinolenta*	*Olpogastra lugubris*	*Phaon iridipennis*
Agriocnemis victoria	*Cyanothemis simpsoni*	*Orthetrum abbotti*	*Phyllogomphus selysi*
Allocnemis nigripes	*Diplacodes lefebvrii*	*Orthetrum austeni*	*Phyllomacromia aureozona*
Allocnemis pauli	*Diplacodes luminans*	*Orthetrum brachiale*	*Phyllomacromia contumax*
Anax congoliath	*Diplacodes pumila*	*Orthetrum caffrum*	*Phyllomacromia hervei*
Anax ephippiger	*Elattoneura acuta*	*Orthetrum chrysostigma*	*Phyllomacromia melania*
Anax imperator	*Elattoneura glauca*	*Orthetrum guineense*	*Platycypha angolensis*
Anax speratus	*Elattoneura lliba*	*Orthetrum hintzi*	*Platycypha caligata*
Anax tristis	*Hadrothemis coacta*	*Orthetrum icteromelas*	*Platycypha rufitibia*
Azuragrion nigridorsum	*Heliaeschna fuliginosa*	*Orthetrum julia*	*Porpax asperipes*
Brachythemis leucosticta	*Hemistigma albipunctum*	*Orthetrum machadoi*	*Porpax risi*
Ceriagrion annulatum	*Ischnura senegalensis*	*Orthetrum macrostigma*	*Pseudagrion acaciae*
Ceriagrion corallinum	*Lestes amicus*	*Orthetrum microstigma*	*Pseudagrion angolense*

FW551: Cuanza (*continued*)

Species	Species	Species	Species
Pseudagrion deningi	*Pseudagrion simonae*	*Trithemis annulata*	*Trithemis pruinata*
Pseudagrion estesi	*Pseudagrion sjoestedti*	*Trithemis apicalis*	*Trithemis stictica*
Pseudagrion glaucescens	*Pseudagrion sublacteum*	*Trithemis arteriosa*	*Umma electa*
Pseudagrion greeni	*Rhyothemis fenestrina*	*Trithemis basitincta*	*Umma longistigma*
Pseudagrion inconspicuum	*Rhyothemis semihyalina*	*Trithemis dichroa*	*Umma mesostigma*
Pseudagrion isidromorai	*Sapho orichalcea*	*Trithemis dorsalis*	*Urothemis assignata*
Pseudagrion kersteni	*Sympetrum fonscolombii*	*Trithemis furva*	*Urothemis edwardsii*
Pseudagrion kibalense	*Tetrathemis fraseri*	*Trithemis imitata*	*Zygonyx flavicosta*
Pseudagrion massaicum	*Thermochoria jeanneli*	*Trithemis integra*	*Zygonyx natalensis*
Pseudagrion melanicterum	*Tholymis tillarga*	*Trithemis kirbyi*	*Zygonyx regisalberti*
Pseudagrion salisburyense	*Tramea basilaris*	*Trithemis nuptialis*	*Zygonyx torridus*
Pseudagrion serrulatum	*Trithemis aconita*	*Trithemis pluvialis*	

FW552: Namib (74 species, 3 322 records)

Species	Species	Species	Species
Africallagma glaucum	*Hemistigma albipunctum*	*Paragomphus cognatus*	*Tramea limbata*
Agriocnemis exilis	*Ictinogomphus ferox*	*Paragomphus elpidius*	*Trithemis annulata*
Anax ephippiger	*Ischnura senegalensis*	*Paragomphus genei*	*Trithemis arteriosa*
Anax imperator	*Lestes pallidus*	*Phaon iridipennis*	*Trithemis donaldsoni*
Anax speratus	*Lestinogomphus angustus*	*Phyllogomphus selysi*	*Trithemis furva*
Anax tristis	*Mesocnemis singularis*	*Phyllomacromia contumax*	*Trithemis hecate*
Azuragrion nigridorsum	*Nesciothemis farinosa*	*Phyllomacromia picta*	*Trithemis kirbyi*
Brachythemis lacustris	*Olpogastra lugubris*	*Pseudagrion acaciae*	*Trithemis monardi*
Brachythemis leucosticta	*Orthetrum abbotti*	*Pseudagrion glaucescens*	*Trithemis stictica*
Bradinopyga cornuta	*Orthetrum brachiale*	*Pseudagrion hamoni*	*Trithemis werneri*
Ceratogomphus pictus	*Orthetrum chrysostigma*	*Pseudagrion kersteni*	*Trithetrum navasi*
Ceriagrion glabrum	*Orthetrum julia*	*Pseudagrion massaicum*	*Urothemis assignata*
Crenigomphus kavangoensis	*Orthetrum machadoi*	*Pseudagrion nubicum*	*Urothemis edwardsii*
Crocothemis divisa	*Orthetrum trinacria*	*Pseudagrion salisburyense*	*Zosteraeschna minuscula*
Crocothemis erythraea	*Palpopleura deceptor*	*Pseudagrion sublacteum*	*Zygonoides fuelleborni*
Crocothemis sanguinolenta	*Palpopleura jucunda*	*Rhyothemis semihyalina*	*Zygonyx natalensis*
Diplacodes lefebvrii	*Palpopleura lucia*	*Sympetrum fonscolombii*	*Zygonyx torridus*
Diplacodes luminans	*Pantala flavescens*	*Tholymis tillarga*	
Elattoneura glauca	*Paragomphus cataractae*	*Tramea basilaris*	

FW553: Etosha (35 species, 290 records)

Species	Species	Species	Species
Agriocnemis exilis	*Anax tristis*	*Ceriagrion glabrum*	*Diplacodes lefebvrii*
Anax ephippiger	*Brachythemis leucosticta*	*Crocothemis erythraea*	*Diplacodes luminans*
Anax imperator	*Bradinopyga cornuta*	*Crocothemis sanguinolenta*	*Ictinogomphus ferox*

FW553: Etosha (*continued*)

Species	Species	Species	Species
Ischnura senegalensis	*Pantala flavescens*	*Pseudagrion nubicum*	*Trithemis arteriosa*
Lestes pallidus	*Paragomphus genei*	*Rhyothemis semihyalina*	*Trithemis hecate*
Orthetrum brachiale	*Pseudagrion acaciae*	*Sympetrum fonscolombii*	*Trithemis kirbyi*
Orthetrum chrysostigma	*Pseudagrion coeleste*	*Tholymis tillarga*	*Urothemis edwardsii*
Orthetrum trinacria	*Pseudagrion kersteni*	*Tramea basilaris*	*Zosteraeschna minuscula*
Palpopleura jucunda	*Pseudagrion massaicum*	*Trithemis annulata*	

FW554: Karstveld Sink Holes (48 species, 373 records)

Species	Species	Species	Species
Africallagma glaucum	*Diplacodes lefebvrii*	*Orthetrum chrysostigma*	*Pseudagrion massaicum*
Agriocnemis exilis	*Diplacodes luminans*	*Orthetrum julia*	*Pseudagrion sublacteum*
Anax ephippiger	*Hemistigma albipunctum*	*Orthetrum machadoi*	*Rhyothemis semihyalina*
Anax imperator	*Ictinogomphus ferox*	*Orthetrum trinacria*	*Sympetrum fonscolombii*
Anax speratus	*Ischnura senegalensis*	*Palpopleura jucunda*	*Tholymis tillarga*
Anax tristis	*Lestes dissimulans*	*Palpopleura lucia*	*Tramea basilaris*
Azuragrion nigridorsum	*Lestes pallidus*	*Palpopleura portia*	*Trithemis annulata*
Brachythemis leucosticta	*Lestes virgatus*	*Pantala flavescens*	*Trithemis arteriosa*
Bradinopyga cornuta	*Nesciothemis farinosa*	*Paragomphus cognatus*	*Trithemis hecate*
Ceriagrion glabrum	*Orthetrum abbotti*	*Paragomphus genei*	*Trithemis kirbyi*
Crocothemis erythraea	*Orthetrum brachiale*	*Phyllomacromia contumax*	*Trithemis monardi*
Crocothemis sanguinolenta	*Orthetrum caffrum*	*Pseudagrion kersteni*	*Zygonyx torridus*

FW555: Zambezian Headwaters (197 species, 2 597 records)

Species	Species	Species	Species
Aciagrion africanum	*Africallagma glaucum*	*Anaciaeschna triangulifera*	*Ceriagrion katamborae*
Aciagrion gracile	*Africallagma pallidulum*	*Anax congoliath*	*Ceriagrion sakejii*
Aciagrion heterostictum	*Africallagma pseudelongatum*	*Anax imperator*	*Ceriagrion suave*
Aciagrion nodosum	*Africallagma sinuatum*	*Anax speratus*	*Ceriagrion varians*
Aciagrion steeleae	*Africallagma subtile*	*Anax tristis*	*Ceriagrion whellani*
Acisoma inflatum	*Africallagma vaginale*	*Atoconeura biordinata*	*Chalcostephia flavifrons*
Acisoma trifidum	*Afroaeschna scotias*	*Atoconeura pseudeudoxia*	*Chlorocypha consueta*
Aethiothemis basilewskyi	*Agriocnemis angolensis*	*Azuragrion nigridorsum*	*Chlorocypha crocea*
Aethiothemis bequaerti	*Agriocnemis bumhilli*	*Brachythemis lacustris*	*Chlorocypha fabamacula*
Aethiothemis ellioti	*Agriocnemis exilis*	*Brachythemis leucosticta*	*Chlorocypha frigida*
Aethiothemis mediofasciata	*Agriocnemis gratiosa*	*Bradinopyga cornuta*	*Crenigomphus cornutus*
Aethiothemis solitaria	*Agriocnemis pinheyi*	*Ceriagrion bakeri*	*Crenigomphus hartmanni*
Aethriamanta rezia	*Agriocnemis victoria*	*Ceriagrion corallinum*	*Crocothemis brevistigma*
Africallagma fractum	*Allocnemis wittei*	*Ceriagrion glabrum*	*Crocothemis divisa*

FW555: Zambezian Headwaters (*continued*)

Species	Species	Species	Species
Crocothemis erythraea	*Neodythemis klingi*	*Phyllogomphus annulus*	*Pseudagrion sublacteum*
Crocothemis sanguinolenta	*Neodythemis preussi*	*Phyllomacromia aureozona*	*Pseudagrion sudanicum*
Crocothemis saxicolor	*Nesciothemis farinosa*	*Phyllomacromia contumax*	*Rhyothemis fenestrina*
Diastatomma selysi	*Nesciothemis fitzgeraldi*	*Phyllomacromia melania*	*Rhyothemis mariposa*
Diastatomma soror	*Notiothemis robertsi*	*Phyllomacromia monoceros*	*Rhyothemis semihyalina*
Diplacodes deminuta	*Notogomphus praetorius*	*Phyllomacromia picta*	*Thermochoria jeanneli*
Diplacodes lefebvrii	*Olpogastra lugubris*	*Phyllomacromia unifasciata*	*Tholymis tillarga*
Diplacodes luminans	*Onychogomphus kitchingmani*	*Pinheyagrion angolicum*	*Tramea basilaris*
Diplacodes pumila	*Onychogomphus seydeli*	*Pinheyschna rileyi*	*Trithemis aconita*
Elattoneura cellularis	*Orthetrum abbotti*	*Platycypha caligata*	*Trithemis annulata*
Elattoneura glauca	*Orthetrum angustiventre*	*Platycypha lacustris*	*Trithemis anomala*
Eleuthemis quadrigutta	*Orthetrum austeni*	*Porpax asperipes*	*Trithemis arteriosa*
Gynacantha manderica	*Orthetrum brachiale*	*Porpax risi*	*Trithemis bifida*
Gynacantha nigeriensis	*Orthetrum caffrum*	*Pseudagrion angolense*	*Trithemis dichroa*
Gynacantha sextans	*Orthetrum chrysostigma*	*Pseudagrion assegaii*	*Trithemis dorsalis*
Gynacantha vesiculata	*Orthetrum guineense*	*Pseudagrion coeleste*	*Trithemis furva*
Gynacantha villosa	*Orthetrum hintzi*	*Pseudagrion coeruleipunctum*	*Trithemis grouti*
Hadrothemis camarensis	*Orthetrum icteromelas*	*Pseudagrion deningi*	*Trithemis hecate*
Hadrothemis defecta	*Orthetrum julia*	*Pseudagrion estesi*	*Trithemis kirbyi*
Hadrothemis scabrifrons	*Orthetrum machadoi*	*Pseudagrion fisheri*	*Trithemis leakeyi*
Hadrothemis versuta	*Orthetrum macrostigma*	*Pseudagrion gamblesi*	*Trithemis monardi*
Heliaeschna cynthiae	*Orthetrum microstigma*	*Pseudagrion glaucescens*	*Trithemis nuptialis*
Hemistigma albipunctum	*Orthetrum monardi*	*Pseudagrion greeni*	*Trithemis palustris*
Ictinogomphus dundoensis	*Orthetrum saegeri*	*Pseudagrion hageni*	*Trithemis pluvialis*
Ictinogomphus ferox	*Orthetrum stemmale*	*Pseudagrion hamoni*	*Trithemis pruinata*
Ischnura senegalensis	*Orthetrum trinacria*	*Pseudagrion helenae*	*Trithemis stictica*
Lestes amicus	*Palpopleura albifrons*	*Pseudagrion inconspicuum*	*Umma electa*
Lestes dissimulans	*Palpopleura jucunda*	*Pseudagrion kersteni*	*Urothemis edwardsii*
Lestes ochraceus	*Palpopleura lucia*	*Pseudagrion kibalense*	*Zygonyx atritibiae*
Lestes pinheyi	*Palpopleura portia*	*Pseudagrion makabusiense*	*Zygonyx eusebia*
Lestes plagiatus	*Pantala flavescens*	*Pseudagrion massaicum*	*Zygonyx flavicosta*
Lestes tridens	*Paragomphus cognatus*	*Pseudagrion melanicterum*	*Zygonyx natalensis*
Lestes uncifer	*Paragomphus elpidius*	*Pseudagrion rufostigma*	*Zygonyx torridus*
Lestes virgatus	*Paragomphus genei*	*Pseudagrion salisburyense*	
Malgassophlebia bispina	*Parazyxomma flavicans*	*Pseudagrion sjoestedti*	
Microgomphus nyassicus	*Phaon iridipennis*	*Pseudagrion spernatum*	

FW556: Upper Zambezi Floodplains (113 species, 2 575 records)

Species	Species	Species	Species
Aciagrion heterostictum	*Africallagma subtile*	*Agriocnemis exilis*	*Agriocnemis victoria*
Acisoma inflatum	*Agriocnemis angolensis*	*Agriocnemis gratiosa*	*Allocnemis marshalli*
Aethriamanta rezia	*Agriocnemis bumhilli*	*Agriocnemis ruberrima*	*Anax bangweuluensis*

FW556: Upper Zambezi Floodplains (*continued*)

Species	Species	Species	Species
Anax ephippiger	*Ictinogomphus dundoensis*	*Palpopleura lucia*	*Pseudagrion sublacteum*
Anax imperator	*Ictinogomphus ferox*	*Palpopleura portia*	*Pseudagrion sudanicum*
Anax tristis	*Ischnura senegalensis*	*Pantala flavescens*	*Rhyothemis fenestrina*
Brachythemis lacustris	*Lestes dissimulans*	*Paragomphus cataractae*	*Rhyothemis semihyalina*
Brachythemis leucosticta	*Lestes ictericus*	*Paragomphus elpidius*	*Sympetrum fonscolombii*
Brachythemis wilsoni	*Lestes pallidus*	*Paragomphus genei*	*Tholymis tillarga*
Bradinopyga cornuta	*Lestes pinheyi*	*Paragomphus sabicus*	*Tramea basilaris*
Ceriagrion corallinum	*Lestes plagiatus*	*Parazyxomma flavicans*	*Tramea limbata*
Ceriagrion glabrum	*Lestes uncifer*	*Phaon iridipennis*	*Trithemis aconita*
Ceriagrion katamborae	*Lestinogomphus angustus*	*Phyllogomphus selysi*	*Trithemis aequalis*
Ceriagrion suave	*Mesocnemis singularis*	*Phyllomacromia contumax*	*Trithemis annulata*
Chalcostephia flavifrons	*Nesciothemis farinosa*	*Phyllomacromia picta*	*Trithemis arteriosa*
Crenigomphus cornutus	*Neurogomphus cocytius*	*Pinheyagrion angolicum*	*Trithemis donaldsoni*
Crocothemis divisa	*Neurogomphus zambeziensis*	*Platycypha caligata*	*Trithemis hecate*
Crocothemis erythraea	*Olpogastra lugubris*	*Pseudagrion acaciae*	*Trithemis kirbyi*
Crocothemis sanguinolenta	*Orthetrum abbotti*	*Pseudagrion assegaii*	*Trithemis monardi*
Diplacodes deminuta	*Orthetrum brachiale*	*Pseudagrion coeleste*	*Trithemis palustris*
Diplacodes lefebvrii	*Orthetrum chrysostigma*	*Pseudagrion commoniae*	*Trithetrum navasi*
Diplacodes luminans	*Orthetrum icteromelas*	*Pseudagrion deningi*	*Urothemis assignata*
Elattoneura cellularis	*Orthetrum julia*	*Pseudagrion glaucescens*	*Urothemis edwardsii*
Elattoneura glauca	*Orthetrum machadoi*	*Pseudagrion hamoni*	*Zygonoides fuelleborni*
Eleuthemis quadrigutta	*Orthetrum robustum*	*Pseudagrion massaicum*	*Zygonyx natalensis*
Gomphidia quarrei	*Orthetrum stemmale*	*Pseudagrion nubicum*	*Zygonyx torridus*
Gynacantha manderica	*Orthetrum trinacria*	*Pseudagrion rufostigma*	
Gynacantha villosa	*Palpopleura deceptor*	*Pseudagrion salisburyense*	
Hemistigma albipunctum	*Palpopleura jucunda*	*Pseudagrion sjoestedti*	

FW557: Kafue (73 species, 323 records)

Species	Species	Species	Species
Aciagrion heterostictum	*Crocothemis divisa*	*Lestes pallidus*	*Orthetrum brachiale*
Agriocnemis exilis	*Crocothemis erythraea*	*Lestes pinheyi*	*Orthetrum machadoi*
Agriocnemis gratiosa	*Crocothemis sanguinolenta*	*Lestes plagiatus*	*Orthetrum stemmale*
Anax imperator	*Diplacodes lefebvrii*	*Lestes tridens*	*Orthetrum trinacria*
Azuragrion nigridorsum	*Diplacodes luminans*	*Lestes uncifer*	*Palpopleura lucia*
Brachythemis lacustris	*Elattoneura glauca*	*Lestes virgatus*	*Palpopleura portia*
Brachythemis leucosticta	*Gomphidia quarrei*	*Lestinogomphus angustus*	*Pantala flavescens*
Ceriagrion glabrum	*Hemistigma albipunctum*	*Mesocnemis singularis*	*Paragomphus elpidius*
Ceriagrion suave	*Ictinogomphus ferox*	*Nesciothemis farinosa*	*Paragomphus genei*
Chalcostephia flavifrons	*Ischnura senegalensis*	*Nesciothemis fitzgeraldi*	*Paragomphus zambeziensis*
Crenigomphus hartmanni	*Lestes ochraceus*	*Olpogastra lugubris*	*Phaon iridipennis*

FW557: Kafue (*continued*)

Species	Species	Species	Species
Platycypha caligata	*Pseudagrion nubicum*	*Tramea basilaris*	*Trithemis werneri*
Pseudagrion acaciae	*Pseudagrion rufostigma*	*Trithemis aconita*	*Umma electa*
Pseudagrion assegaii	*Pseudagrion salisburyense*	*Trithemis annulata*	*Urothemis assignata*
Pseudagrion commoniae	*Pseudagrion sjoestedti*	*Trithemis arteriosa*	*Urothemis edwardsii*
Pseudagrion glaucescens	*Pseudagrion sublacteum*	*Trithemis donaldsoni*	*Zygonoides fuelleborni*
Pseudagrion hamoni	*Pseudagrion sudanicum*	*Trithemis furva*	
Pseudagrion kersteni	*Rhyothemis semihyalina*	*Trithemis kirbyi*	
Pseudagrion massaicum	*Tholymis tillarga*	*Trithemis pluvialis*	

FW558: Middle Zambezi – Luangwa (145 species, 1 819 records)

Species	Species	Species	Species
Aciagrion gracile	*Ceriagrion sakejii*	*Lestes plagiatus*	*Paragomphus cognatus*
Aciagrion heterostictum	*Ceriagrion suave*	*Lestes uncifer*	*Paragomphus elpidius*
Aciagrion steeleae	*Ceriagrion whellani*	*Lestes virgatus*	*Paragomphus genei*
Aethiothemis bequaerti	*Chalcostephia flavifrons*	*Lestinogomphus angustus*	*Paragomphus magnus*
Aethiothemis ellioti	*Chlorocypha consueta*	*Lestinogomphus silkeae*	*Paragomphus sabicus*
Aethiothemis solitaria	*Crenigomphus cornutus*	*Mesocnemis singularis*	*Paragomphus zambeziensis*
Aethriamanta rezia	*Crenigomphus hartmanni*	*Nesciothemis farinosa*	*Parazyxomma flavicans*
Africallagma fractum	*Crocothemis divisa*	*Neurogomphus cocytius*	*Phaon iridipennis*
Africallagma glaucum	*Crocothemis erythraea*	*Neurogomphus zambeziensis*	*Phyllogomphus selysi*
Africallagma pallidulum	*Crocothemis sanguinolenta*	*Notogomphus praetorius*	*Phyllomacromia contumax*
Africallagma sinuatum	*Crocothemis saxicolor*	*Notogomphus zernyi*	*Phyllomacromia picta*
Africallagma subtile	*Diplacodes lefebvrii*	*Olpogastra lugubris*	*Platycypha caligata*
Agriocnemis exilis	*Diplacodes luminans*	*Orthetrum abbotti*	*Proischnura subfurcata*
Agriocnemis gratiosa	*Diplacodes pumila*	*Orthetrum brachiale*	*Pseudagrion acaciae*
Agriocnemis victoria	*Elattoneura cellularis*	*Orthetrum caffrum*	*Pseudagrion coeleste*
Allocnemis marshalli	*Elattoneura glauca*	*Orthetrum chrysostigma*	*Pseudagrion commoniae*
Anaciaeschna triangulifera	*Eleuthemis quadrigutta*	*Orthetrum guineense*	*Pseudagrion gamblesi*
Anax ephippiger	*Gomphidia quarrei*	*Orthetrum hintzi*	*Pseudagrion glaucescens*
Anax imperator	*Gynacantha manderica*	*Orthetrum julia*	*Pseudagrion hageni*
Anax speratus	*Gynacantha villosa*	*Orthetrum machadoi*	*Pseudagrion hamoni*
Anax tristis	*Hemistigma albipunctum*	*Orthetrum microstigma*	*Pseudagrion inconspicuum*
Atoconeura biordinata	*Ictinogomphus ferox*	*Orthetrum stemmale*	*Pseudagrion kersteni*
Azuragrion nigridorsum	*Ischnura senegalensis*	*Orthetrum trinacria*	*Pseudagrion makabusiense*
Brachythemis lacustris	*Lestes amicus*	*Palpopleura deceptor*	*Pseudagrion massaicum*
Brachythemis leucosticta	*Lestes dissimulans*	*Palpopleura jucunda*	*Pseudagrion melanicterum*
Bradinopyga cornuta	*Lestes ictericus*	*Palpopleura lucia*	*Pseudagrion nubicum*
Ceratogomphus pictus	*Lestes ochraceus*	*Palpopleura portia*	*Pseudagrion rufostigma*
Ceriagrion corallinum	*Lestes pallidus*	*Pantala flavescens*	*Pseudagrion salisburyense*
Ceriagrion glabrum	*Lestes pinheyi*	*Paragomphus cataractae*	*Pseudagrion sjoestedti*

FW558: Middle Zambezi – Luangwa (*continued*)

Species	Species	Species	Species
Pseudagrion spernatum	*Trithemis aconita*	*Trithemis palustris*	*Zygonoides fuelleborni*
Pseudagrion sublacteum	*Trithemis annulata*	*Trithemis pluvialis*	*Zygonyx atritibiae*
Pseudagrion sudanicum	*Trithemis arteriosa*	*Trithemis stictica*	*Zygonyx flavicosta*
Rhyothemis semihyalina	*Trithemis donaldsoni*	*Trithemis werneri*	*Zygonyx natalensis*
Sympetrum fonscolombii	*Trithemis dorsalis*	*Umma electa*	*Zygonyx torridus*
Tetrathemis polleni	*Trithemis furva*	*Urothemis assignata*	
Tholymis tillarga	*Trithemis kirbyi*	*Urothemis edwardsii*	
Tramea basilaris	*Trithemis monardi*	*Zosteraeschna usambarica*	

FW559: Lake Malawi (139 species, 1 862 records)

Species	Species	Species	Species
Aciagrion africanum	*Chlorocypha consueta*	*Lestes uncifer*	*Paragomphus sabicus*
Aciagrion gracile	*Crenigomphus hartmanni*	*Lestes virgatus*	*Phaon iridipennis*
Aciagrion steeleae	*Crocothemis divisa*	*Lestinogomphus angustus*	*Phyllogomphus selysi*
Aethiothemis bequaerti	*Crocothemis erythraea*	*Mesocnemis singularis*	*Phyllomacromia contumax*
Aethiothemis solitaria	*Crocothemis sanguinolenta*	*Microgomphus nyassicus*	*Phyllomacromia monoceros*
Aethriamanta rezia	*Crocothemis saxicolor*	*Nesciothemis farinosa*	*Phyllomacromia picta*
Africallagma fractum	*Diplacodes deminuta*	*Notogomphus dendrohyrax*	*Pinheyschna rileyi*
Africallagma glaucum	*Diplacodes lefebvrii*	*Notogomphus zernyi*	*Platycypha caligata*
Africallagma pallidulum	*Diplacodes luminans*	*Olpogastra lugubris*	*Porpax risi*
Africallagma sinuatum	*Elattoneura cellularis*	*Orthetrum abbotti*	*Proischnura subfurcata*
Africallagma subtile	*Elattoneura glauca*	*Orthetrum brachiale*	*Pseudagrion acaciae*
Agriocnemis exilis	*Gynacantha bullata*	*Orthetrum caffrum*	*Pseudagrion coeleste*
Agriocnemis gratiosa	*Gynacantha immaculifrons*	*Orthetrum chrysostigma*	*Pseudagrion commoniae*
Allocnemis abbotti	*Gynacantha manderica*	*Orthetrum guineense*	*Pseudagrion glaucescens*
Allocnemis marshalli	*Gynacantha usambarica*	*Orthetrum hintzi*	*Pseudagrion hageni*
Anaciaeschna triangulifera	*Gynacantha vesiculata*	*Orthetrum icteromelas*	*Pseudagrion hamoni*
Anax chloromelas	*Gynacantha villosa*	*Orthetrum julia*	*Pseudagrion inconspicuum*
Anax ephippiger	*Hadrothemis scabrifrons*	*Orthetrum machadoi*	*Pseudagrion kersteni*
Anax imperator	*Hemicordulia africana*	*Orthetrum stemmale*	*Pseudagrion massaicum*
Anax speratus	*Hemistigma albipunctum*	*Orthetrum trinacria*	*Pseudagrion nubicum*
Anax tristis	*Ictinogomphus ferox*	*Palpopleura deceptor*	*Pseudagrion salisburyense*
Atoconeura biordinata	*Ischnura senegalensis*	*Palpopleura jucunda*	*Pseudagrion sjoestedti*
Azuragrion nigridorsum	*Lestes amicus*	*Palpopleura lucia*	*Pseudagrion spernatum*
Brachythemis lacustris	*Lestes dissimulans*	*Palpopleura portia*	*Pseudagrion sublacteum*
Brachythemis leucosticta	*Lestes ictericus*	*Pantala flavescens*	*Pseudagrion sudanicum*
Bradinopyga cornuta	*Lestes ochraceus*	*Paragomphus cognatus*	*Rhyothemis fenestrina*
Ceriagrion glabrum	*Lestes pallidus*	*Paragomphus elpidius*	*Rhyothemis semihyalina*
Ceriagrion suave	*Lestes pinheyi*	*Paragomphus genei*	*Sympetrum fonscolombii*
Chalcostephia flavifrons	*Lestes plagiatus*	*Paragomphus nyasicus*	*Teinobasis alluaudi*

FW559: Lake Malawi (*continued*)

Species	Species	Species	Species
Tetrathemis polleni	*Trithemis arteriosa*	*Trithemis pluvialis*	*Urothemis edwardsii*
Thermochoria equivocata	*Trithemis donaldsoni*	*Trithemis stictica*	*Zosteraeschna usambarica*
Tholymis tillarga	*Trithemis furva*	*Trithemis werneri*	*Zygonoides fuelleborni*
Tramea basilaris	*Trithemis hecate*	*Trithetrum navasi*	*Zygonyx natalensis*
Trithemis aconita	*Trithemis kirbyi*	*Umma declivium*	*Zygonyx torridus*
Trithemis annulata	*Trithemis monardi*	*Urothemis assignata*	

FW560: Zambezian Highveld (119 species, 1 449 records)

Species	Species	Species	Species
Aciagrion gracile	*Diplacodes pumila*	*Orthetrum julia*	*Pseudagrion salisburyense*
Acisoma inflatum	*Elattoneura glauca*	*Orthetrum machadoi*	*Pseudagrion sjoestedti*
Acisoma variegatum	*Gomphidia quarrei*	*Orthetrum stemmale*	*Pseudagrion spernatum*
Africallagma fractum	*Gynacantha manderica*	*Orthetrum trinacria*	*Pseudagrion sublacteum*
Africallagma glaucum	*Hemistigma albipunctum*	*Palpopleura deceptor*	*Pseudagrion sudanicum*
Africallagma sinuatum	*Ictinogomphus ferox*	*Palpopleura jucunda*	*Rhyothemis semihyalina*
Africallagma subtile	*Ischnura senegalensis*	*Palpopleura lucia*	*Sympetrum fonscolombii*
Agriocnemis exilis	*Lestes amicus*	*Palpopleura portia*	*Tetrathemis polleni*
Agriocnemis pinheyi	*Lestes dissimulans*	*Pantala flavescens*	*Tholymis tillarga*
Allocnemis marshalli	*Lestes ictericus*	*Paragomphus cognatus*	*Tramea basilaris*
Anax ephippiger	*Lestes ochraceus*	*Paragomphus elpidius*	*Tramea limbata*
Anax imperator	*Lestes pallidus*	*Paragomphus genei*	*Trithemis annulata*
Anax speratus	*Lestes pinheyi*	*Paragomphus magnus*	*Trithemis arteriosa*
Anax tristis	*Lestes plagiatus*	*Paragomphus sabicus*	*Trithemis donaldsoni*
Atoconeura biordinata	*Lestes virgatus*	*Phyllomacromia contumax*	*Trithemis dorsalis*
Azuragrion nigridorsum	*Lestinogomphus angustus*	*Phyllomacromia monoceros*	*Trithemis furva*
Brachythemis lacustris	*Mesocnemis singularis*	*Phyllomacromia picta*	*Trithemis hecate*
Brachythemis leucosticta	*Nesciothemis farinosa*	*Pinheyschna rileyi*	*Trithemis kirbyi*
Bradinopyga cornuta	*Notiothemis jonesi*	*Platycypha caligata*	*Trithemis monardi*
Ceratogomphus pictus	*Notogomphus praetorius*	*Proischnura subfurcata*	*Trithemis pluvialis*
Ceriagrion glabrum	*Notogomphus zernyi*	*Pseudagrion acaciae*	*Trithemis stictica*
Ceriagrion suave	*Olpogastra lugubris*	*Pseudagrion assegaii*	*Trithemis werneri*
Chlorocypha consueta	*Onychogomphus supinus*	*Pseudagrion commoniae*	*Urothemis assignata*
Crenigomphus hartmanni	*Orthetrum abbotti*	*Pseudagrion gamblesi*	*Urothemis edwardsii*
Crocothemis divisa	*Orthetrum brachiale*	*Pseudagrion hageni*	*Zosteraeschna usambarica*
Crocothemis erythraea	*Orthetrum caffrum*	*Pseudagrion hamoni*	*Zygonoides fuelleborni*
Crocothemis sanguinolenta	*Orthetrum chrysostigma*	*Pseudagrion kersteni*	*Zygonyx natalensis*
Crocothemis saxicolor	*Orthetrum guineense*	*Pseudagrion makabusiense*	*Zygonyx torridus*
Diplacodes lefebvrii	*Orthetrum hintzi*	*Pseudagrion massaicum*	
Diplacodes luminans	*Orthetrum icteromelas*	*Pseudagrion nubicum*	

FW561: Lower Zambezi (83 species, 670 records)

Species	Species	Species	Species
Acisoma variegatum	*Elattoneura glauca*	*Palpopleura deceptor*	*Pseudagrion salisburyense*
Aethriamanta rezia	*Gynacantha manderica*	*Palpopleura jucunda*	*Pseudagrion sublacteum*
Agriocnemis exilis	*Hemistigma albipunctum*	*Palpopleura lucia*	*Rhyothemis semihyalina*
Agriocnemis gratiosa	*Ictinogomphus ferox*	*Palpopleura portia*	*Tetrathemis polleni*
Anaciaeschna triangulifera	*Ischnura senegalensis*	*Pantala flavescens*	*Tholymis tillarga*
Anax chloromelas	*Lestes amicus*	*Paragomphus cognatus*	*Trithemis aconita*
Anax ephippiger	*Lestes plagiatus*	*Paragomphus genei*	*Trithemis annulata*
Anax imperator	*Lestes virgatus*	*Paragomphus magnus*	*Trithemis arteriosa*
Anax speratus	*Mesocnemis singularis*	*Paragomphus sabicus*	*Trithemis donaldsoni*
Brachythemis lacustris	*Nesciothemis farinosa*	*Phaon iridipennis*	*Trithemis furva*
Brachythemis leucosticta	*Neurogomphus zambeziensis*	*Phyllomacromia picta*	*Trithemis kirbyi*
Bradinopyga cornuta	*Notogomphus dendrohyrax*	*Platycypha caligata*	*Trithemis pluvialis*
Ceriagrion glabrum	*Olpogastra lugubris*	*Pseudagrion acaciae*	*Trithemis stictica*
Ceriagrion suave	*Orthetrum brachiale*	*Pseudagrion coeleste*	*Trithemis werneri*
Crenigomphus hartmanni	*Orthetrum caffrum*	*Pseudagrion commoniae*	*Urothemis assignata*
Crocothemis erythraea	*Orthetrum chrysostigma*	*Pseudagrion glaucescens*	*Urothemis edwardsii*
Crocothemis sanguinolenta	*Orthetrum guineense*	*Pseudagrion hageni*	*Urothemis luciana*
Crocothemis saxicolor	*Orthetrum hintzi*	*Pseudagrion hamoni*	*Zygonoides fuelleborni*
Diplacodes lefebvrii	*Orthetrum julia*	*Pseudagrion helenae*	*Zygonyx natalensis*
Diplacodes luminans	*Orthetrum stemmale*	*Pseudagrion kersteni*	*Zygonyx torridus*
Elattoneura cellularis	*Orthetrum trinacria*	*Pseudagrion massaicum*	

FW562: Mulanje (74 species, 353 records)

Species	Species	Species	Species
Africallagma glaucum	*Crocothemis sanguinolenta*	*Oreocnemis phoenix*	*Phyllomacromia monoceros*
Africallagma subtile	*Crocothemis saxicolor*	*Orthetrum abbotti*	*Phyllomacromia picta*
Agriocnemis exilis	*Diplacodes lefebvrii*	*Orthetrum brachiale*	*Pinheyschna rileyi*
Allocnemis marshalli	*Elattoneura cellularis*	*Orthetrum caffrum*	*Platycypha caligata*
Anaciaeschna triangulifera	*Elattoneura glauca*	*Orthetrum chrysostigma*	*Proischnura subfurcata*
Anax ephippiger	*Gomphidia quarrei*	*Orthetrum guineense*	*Pseudagrion commoniae*
Anax imperator	*Gynacantha villosa*	*Orthetrum hintzi*	*Pseudagrion gamblesi*
Anax speratus	*Ictinogomphus ferox*	*Orthetrum julia*	*Pseudagrion glaucescens*
Atoconeura biordinata	*Ischnura senegalensis*	*Orthetrum machadoi*	*Pseudagrion hageni*
Bradinopyga cornuta	*Lestes plagiatus*	*Orthetrum trinacria*	*Pseudagrion hamoni*
Ceriagrion glabrum	*Lestes virgatus*	*Palpopleura lucia*	*Pseudagrion inconspicuum*
Chlorocypha consueta	*Lestinogomphus angustus*	*Palpopleura portia*	*Pseudagrion kersteni*
Chlorolestes elegans	*Nepogomphoides stuhlmanni*	*Pantala flavescens*	*Pseudagrion massaicum*
Crenigomphus hartmanni	*Nesciothemis farinosa*	*Paragomphus cognatus*	*Pseudagrion salisburyense*
Crocothemis divisa	*Notiothemis jonesi*	*Paragomphus sabicus*	*Pseudagrion spernatum*
Crocothemis erythraea	*Notogomphus dendrohyrax*	*Phaon iridipennis*	*Rhyothemis semihyalina*

FW562: Mulanje (*continued*)

Species	Species	Species	Species
Tetrathemis polleni	*Trithemis furva*	*Zosteraeschna usambarica*	*Zygonyx torridus*
Tramea basilaris	*Trithemis kirbyi*	*Zygonoides fuelleborni*	
Trithemis arteriosa	*Trithemis pluvialis*	*Zygonyx natalensis*	

FW563: Eastern Zimbabwe Highlands (120 species, 1 381 records)

Species	Species	Species	Species
Aciagrion gracile	*Crocothemis sanguinolenta*	*Orthetrum guineense*	*Pseudagrion glaucescens*
Acisoma inflatum	*Crocothemis saxicolor*	*Orthetrum hintzi*	*Pseudagrion hageni*
Acisoma variegatum	*Diplacodes lefebvrii*	*Orthetrum icteromelas*	*Pseudagrion hamoni*
Aethriamanta rezia	*Diplacodes luminans*	*Orthetrum julia*	*Pseudagrion kersteni*
Africallagma cuneistigma	*Diplacodes pumila*	*Orthetrum machadoi*	*Pseudagrion makabusiense*
Africallagma fractum	*Elattoneura glauca*	*Orthetrum stemmale*	*Pseudagrion massaicum*
Africallagma glaucum	*Eleuthemis quadrigutta*	*Orthetrum trinacria*	*Pseudagrion salisburyense*
Africallagma subtile	*Gomphidia quarrei*	*Palpopleura jucunda*	*Pseudagrion sjoestedti*
Agriocnemis exilis	*Hadrothemis scabrifrons*	*Palpopleura lucia*	*Pseudagrion spernatum*
Agriocnemis gratiosa	*Hemistigma albipunctum*	*Palpopleura portia*	*Pseudagrion sublacteum*
Agriocnemis pinheyi	*Ictinogomphus ferox*	*Pantala flavescens*	*Pseudagrion vumbaense*
Allocnemis marshalli	*Ischnura senegalensis*	*Paragomphus cognatus*	*Rhyothemis semihyalina*
Anax ephippiger	*Lestes amicus*	*Paragomphus elpidius*	*Tetrathemis polleni*
Anax imperator	*Lestes plagiatus*	*Paragomphus genei*	*Tramea basilaris*
Anax speratus	*Lestes tridens*	*Paragomphus magnus*	*Tramea limbata*
Anax tristis	*Lestes uncifer*	*Paragomphus sabicus*	*Trithemis aconita*
Atoconeura biordinata	*Lestes virgatus*	*Phaon iridipennis*	*Trithemis annulata*
Azuragrion nigridorsum	*Lestinogomphus angustus*	*Phyllomacromia contumax*	*Trithemis arteriosa*
Brachythemis lacustris	*Mesocnemis singularis*	*Phyllomacromia monoceros*	*Trithemis donaldsoni*
Brachythemis leucosticta	*Microgomphus nyassicus*	*Phyllomacromia picta*	*Trithemis dorsalis*
Bradinopyga cornuta	*Nesciothemis farinosa*	*Pinheyschna rileyi*	*Trithemis furva*
Ceratogomphus pictus	*Notiothemis jonesi*	*Pinheyschna subpupillata*	*Trithemis kirbyi*
Ceriagrion glabrum	*Notogomphus dendrohyrax*	*Platycypha caligata*	*Trithemis monardi*
Ceriagrion suave	*Notogomphus praetorius*	*Platycypha fitzsimonsi*	*Trithemis pluvialis*
Ceriagrion whellani	*Notogomphus zernyi*	*Platycypha inyangae*	*Trithemis stictica*
Chlorocypha consueta	*Onychogomphus supinus*	*Porpax risi*	*Urothemis assignata*
Chlorolestes elegans	*Orthetrum abbotti*	*Proischnura subfurcata*	*Zosteraeschna usambarica*
Crenigomphus hartmanni	*Orthetrum brachiale*	*Pseudagrion assegaii*	*Zygonoides fuelleborni*
Crocothemis divisa	*Orthetrum caffrum*	*Pseudagrion commoniae*	*Zygonyx natalensis*
Crocothemis erythraea	*Orthetrum chrysostigma*	*Pseudagrion gamblesi*	*Zygonyx torridus*

FW564: Coastal East Africa (135 species, 1 291 records)

Species	Species	Species	Species
Aciagrion dondoense	*Diplacodes lefebvrii*	*Orthetrum caffrum*	*Pseudagrion lindicum*
Aciagrion gracile	*Diplacodes luminans*	*Orthetrum chrysostigma*	*Pseudagrion massaicum*
Acisoma inflatum	*Diplacodes pumila*	*Orthetrum guineense*	*Pseudagrion salisburyense*
Africallagma elongatum	*Elattoneura cellularis*	*Orthetrum hintzi*	*Pseudagrion sjoestedti*
Africallagma fractum	*Elattoneura glauca*	*Orthetrum icteromelas*	*Pseudagrion spernatum*
Africallagma sinuatum	*Eleuthemis quadrigutta*	*Orthetrum julia*	*Pseudagrion sublacteum*
Africallagma subtile	*Gomphidia quarrei*	*Orthetrum machadoi*	*Rhyothemis semihyalina*
Agriocnemis exilis	*Gynacantha immaculifrons*	*Orthetrum macrostigma*	*Teinobasis alluaudi*
Agriocnemis gratiosa	*Gynacantha manderica*	*Orthetrum stemmale*	*Tetrathemis polleni*
Agriocnemis pinheyi	*Gynacantha usambarica*	*Orthetrum trinacria*	*Thermochoria jeanneli*
Allocnemis abbotti	*Gynacantha villosa*	*Palpopleura deceptor*	*Tholymis tillarga*
Allocnemis marshalli	*Hadrothemis scabrifrons*	*Palpopleura jucunda*	*Tramea basilaris*
Anaciaeschna triangulifera	*Hemistigma albipunctum*	*Palpopleura lucia*	*Tramea limbata*
Anax ephippiger	*Ictinogomphus ferox*	*Palpopleura portia*	*Trithemis aconita*
Anax imperator	*Ischnura senegalensis*	*Pantala flavescens*	*Trithemis annulata*
Anax speratus	*Lestes amicus*	*Paragomphus cognatus*	*Trithemis arteriosa*
Anax tristis	*Lestes dissimulans*	*Paragomphus elpidius*	*Trithemis bifida*
Atoconeura biordinata	*Lestes ochraceus*	*Paragomphus genei*	*Trithemis donaldsoni*
Azuragrion nigridorsum	*Lestes pinheyi*	*Paragomphus magnus*	*Trithemis dorsalis*
Brachythemis lacustris	*Lestes plagiatus*	*Paragomphus sabicus*	*Trithemis furva*
Brachythemis leucosticta	*Lestes tridens*	*Phaon iridipennis*	*Trithemis hecate*
Bradinopyga cornuta	*Lestes uncifer*	*Phyllomacromia monoceros*	*Trithemis integra*
Ceriagrion glabrum	*Lestes virgatus*	*Phyllomacromia picta*	*Trithemis kirbyi*
Ceriagrion kordofanicum	*Lestinogomphus angustus*	*Pinheyschna rileyi*	*Trithemis pluvialis*
Ceriagrion suave	*Mesocnemis singularis*	*Platycypha auripes*	*Trithemis stictica*
Chalcostephia flavifrons	*Nepogomphoides stuhlmanni*	*Platycypha caligata*	*Trithemis werneri*
Chlorocypha consueta	*Nesciothemis farinosa*	*Proischnura subfurcata*	*Umma declivium*
Chlorolestes elegans	*Notiothemis jonesi*	*Pseudagrion acaciae*	*Urothemis assignata*
Coryphagrion grandis	*Notogomphus dendrohyrax*	*Pseudagrion coeleste*	*Urothemis edwardsii*
Crenigomphus hartmanni	*Notogomphus zernyi*	*Pseudagrion commoniae*	*Zosteraeschna usambarica*
Crocothemis divisa	*Olpogastra lugubris*	*Pseudagrion hageni*	*Zygonoides fuelleborni*
Crocothemis erythraea	*Oreocnemis phoenix*	*Pseudagrion hamoni*	*Zygonyx natalensis*
Crocothemis sanguinolenta	*Orthetrum abbotti*	*Pseudagrion inconspicuum*	*Zygonyx torridus*
Crocothemis saxicolor	*Orthetrum brachiale*	*Pseudagrion kersteni*	

FW565: Lake Rukwa (50 species, 85 records)

Species	Species	Species	Species
Aciagrion gracile	*Anax tristis*	*Crocothemis divisa*	*Elattoneura cellularis*
Africallagma sinuatum	*Atoconeura biordinata*	*Crocothemis erythraea*	*Elattoneura glauca*
Africallagma subtile	*Brachythemis leucosticta*	*Crocothemis sanguinolenta*	*Gynacantha manderica*
Anax imperator	*Ceriagrion glabrum*	*Diplacodes lefebvrii*	*Hemistigma albipunctum*
Anax speratus	*Ceriagrion suave*	*Diplacodes luminans*	*Ischnura senegalensis*

FW565: Lake Rukwa (*continued*)

Species	Species	Species	Species
Lestes plagiatus	*Orthetrum trinacria*	*Pseudagrion salisburyense*	*Trithemis integra*
Lestes virgatus	*Palpopleura jucunda*	*Pseudagrion spernatum*	*Trithemis kirbyi*
Notiothemis robertsi	*Pantala flavescens*	*Thermochoria jeanneli*	*Trithemis pluvialis*
Orthetrum brachiale	*Phaon iridipennis*	*Tholymis tillarga*	*Urothemis assignata*
Orthetrum caffrum	*Pinheyschna rileyi*	*Tramea basilaris*	*Zosteraeschna usambarica*
Orthetrum chrysostigma	*Platycypha caligata*	*Trithemis annulata*	*Zygonyx torridus*
Orthetrum guineense	*Proischnura subfurcata*	*Trithemis furva*	
Orthetrum julia	*Pseudagrion kersteni*	*Trithemis hecate*	

FW566: Southern Eastern Rift (81 species, 384 records)

Species	Species	Species	Species
Aethriamanta rezia	*Crocothemis sanguinolenta*	*Palpopleura portia*	*Pseudagrion salisburyense*
Africallagma elongatum	*Diplacodes lefebvrii*	*Pantala flavescens*	*Pseudagrion spernatum*
Africallagma glaucum	*Diplacodes luminans*	*Paragomphus alluaudi*	*Pseudagrion sublacteum*
Africallagma pseudelongatum	*Elattoneura glauca*	*Paragomphus elpidius*	*Pseudagrion torridum*
Agriocnemis exilis	*Ictinogomphus ferox*	*Paragomphus genei*	*Tholymis tillarga*
Agriocnemis gratiosa	*Ischnura senegalensis*	*Paragomphus magnus*	*Tramea basilaris*
Agriocnemis inversa	*Lestes dissimulans*	*Paragomphus sabicus*	*Trithemis annulata*
Agriocnemis sania	*Lestes pallidus*	*Phaon iridipennis*	*Trithemis arteriosa*
Allocnemis abbotti	*Nesciothemis farinosa*	*Phyllomacromia picta*	*Trithemis donaldsoni*
Anax ephippiger	*Notogomphus kilimandjaricus*	*Pinheyschna meruensis*	*Trithemis furva*
Anax imperator	*Olpogastra lugubris*	*Pinheyschna rileyi*	*Trithemis kirbyi*
Anax speratus	*Orthetrum brachiale*	*Platycypha caligata*	*Trithemis pluvialis*
Anax tristis	*Orthetrum caffrum*	*Platycypha lacustris*	*Trithemis stictica*
Atoconeura kenya	*Orthetrum camerunense*	*Proischnura subfurcata*	*Urothemis assignata*
Brachythemis impartita	*Orthetrum chrysostigma*	*Pseudagrion bicoerulans*	*Urothemis edwardsii*
Brachythemis lacustris	*Orthetrum julia*	*Pseudagrion gamblesi*	*Zosteraeschna ellioti*
Brachythemis leucosticta	*Orthetrum machadoi*	*Pseudagrion hamoni*	*Zygonyx natalensis*
Ceriagrion glabrum	*Orthetrum trinacria*	*Pseudagrion kersteni*	*Zygonyx torridus*
Crenigomphus hartmanni	*Palpopleura deceptor*	*Pseudagrion massaicum*	
Crenigomphus renei	*Palpopleura jucunda*	*Pseudagrion niloticum*	
Crocothemis erythraea	*Palpopleura lucia*	*Pseudagrion nubicum*	

FW567: Tana, Athi & Coastal Drainages (126 species, 1 875 records)

Species	Species	Species	Species
Aethriamanta rezia	*Agriocnemis exilis*	*Anaciaeschna triangulifera*	*Anax speratus*
Africallagma elongatum	*Agriocnemis gratiosa*	*Anax ephippiger*	*Anax tristis*
Africallagma glaucum	*Allocnemis abbotti*	*Anax imperator*	*Atoconeura biordinata*

FW567: Tana, Athi & Coastal Drainages (*continued*)

Species	Species	Species	Species
Atoconeura kenya	*Lestes tridens*	*Paragomphus elpidius*	*Rhyothemis semihyalina*
Azuragrion nigridorsum	*Lestes uncifer*	*Paragomphus genei*	*Sympetrum fonscolombii*
Brachythemis lacustris	*Lestes virgatus*	*Paragomphus magnus*	*Teinobasis alluaudi*
Brachythemis leucosticta	*Lestinogomphus angustus*	*Paragomphus sabicus*	*Tetrathemis polleni*
Brachythemis wilsoni	*Mesocnemis singularis*	*Phaon iridipennis*	*Thermochoria jeanneli*
Bradinopyga cornuta	*Microgomphus nyassicus*	*Phyllogomphus selysi*	*Tholymis tillarga*
Ceriagrion glabrum	*Nesciothemis farinosa*	*Phyllomacromia contumax*	*Tramea basilaris*
Ceriagrion kordofanicum	*Notogomphus dorsalis*	*Phyllomacromia monoceros*	*Tramea limbata*
Ceriagrion suave	*Notogomphus kilimandjaricus*	*Phyllomacromia pallidinervis*	*Trithemis aconita*
Chalcostephia flavifrons	*Notogomphus maathaiae*	*Phyllomacromia picta*	*Trithemis annulata*
Coryphagrion grandis	*Olpogastra lugubris*	*Pinheyschna rileyi*	*Trithemis arteriosa*
Crenigomphus hartmanni	*Orthetrum abbotti*	*Platycypha amboniensis*	*Trithemis bifida*
Crocothemis erythraea	*Orthetrum brachiale*	*Platycypha auripes*	*Trithemis donaldsoni*
Crocothemis sanguinolenta	*Orthetrum caffrum*	*Platycypha caligata*	*Trithemis furva*
Diplacodes lefebvrii	*Orthetrum chrysostigma*	*Proischnura subfurcata*	*Trithemis hecate*
Diplacodes luminans	*Orthetrum guineense*	*Pseudagrion bicoerulans*	*Trithemis kirbyi*
Elattoneura glauca	*Orthetrum hintzi*	*Pseudagrion commoniae*	*Trithemis pluvialis*
Gomphidia quarrei	*Orthetrum icteromelas*	*Pseudagrion gamblesi*	*Trithemis stictica*
Gynacantha manderica	*Orthetrum julia*	*Pseudagrion hageni*	*Trithemis werneri*
Gynacantha usambarica	*Orthetrum machadoi*	*Pseudagrion hamoni*	*Umma declivium*
Gynacantha villosa	*Orthetrum stemmale*	*Pseudagrion kersteni*	*Urothemis assignata*
Hadrothemis scabrifrons	*Orthetrum trinacria*	*Pseudagrion lindicum*	*Urothemis edwardsii*
Hemistigma albipunctum	*Palpopleura deceptor*	*Pseudagrion massaicum*	*Zosteraeschna ellioti*
Ictinogomphus ferox	*Palpopleura jucunda*	*Pseudagrion niloticum*	*Zosteraeschna usambarica*
Ischnura senegalensis	*Palpopleura lucia*	*Pseudagrion salisburyense*	*Zygonoides fuelleborni*
Lestes dissimulans	*Palpopleura portia*	*Pseudagrion sjoestedti*	*Zygonyx natalensis*
Lestes ictericus	*Pantala flavescens*	*Pseudagrion spernatum*	*Zygonyx torridus*
Lestes pallidus	*Paragomphus alluaudi*	*Pseudagrion sublacteum*	
Lestes plagiatus	*Paragomphus cognatus*	*Pseudagrion torridum*	

FW568: Pangani (102 species, 438 records)

Species	Species	Species	Species
Aciagrion gracile	*Anax imperator*	*Coryphagrion grandis*	*Hadrothemis scabrifrons*
Aethriamanta rezia	*Anax speratus*	*Crenigomphus hartmanni*	*Hemistigma albipunctum*
Africallagma elongatum	*Atoconeura biordinata*	*Crocothemis erythraea*	*Ictinogomphus ferox*
Africallagma glaucum	*Atoconeura kenya*	*Crocothemis sanguinolenta*	*Ischnura senegalensis*
Agriocnemis exilis	*Azuragrion nigridorsum*	*Diplacodes lefebvrii*	*Lestes tridens*
Agriocnemis gratiosa	*Brachythemis lacustris*	*Diplacodes luminans*	*Lestes uncifer*
Allocnemis abbotti	*Brachythemis leucosticta*	*Elattoneura glauca*	*Lestinogomphus angustus*
Amanipodagrion gilliesi	*Ceriagrion glabrum*	*Gomphidia quarrei*	*Mesocnemis singularis*
Anaciaeschna triangulifera	*Ceriagrion suave*	*Gynacantha immaculifrons*	*Microgomphus nyassicus*
Anax ephippiger	*Chalcostephia flavifrons*	*Gynacantha usambarica*	*Nepogomphoides stuhlmanni*

FW568: Pangani (*continued*)

Species	Species	Species	Species
Nesciothemis farinosa	*Pantala flavescens*	*Pseudagrion commoniae*	*Trithemis arteriosa*
Neurogomphus zambeziensis	*Paragomphus alluaudi*	*Pseudagrion gamblesi*	*Trithemis donaldsoni*
Notiothemis jonesi	*Paragomphus cognatus*	*Pseudagrion hageni*	*Trithemis furva*
Notogomphus dendrohyrax	*Paragomphus genei*	*Pseudagrion hamoni*	*Trithemis kirbyi*
Notogomphus dorsalis	*Paragomphus magnus*	*Pseudagrion kersteni*	*Trithemis pluvialis*
Notogomphus kilimandjaricus	*Phaon iridipennis*	*Pseudagrion lindicum*	*Trithemis stictica*
Orthetrum abbotti	*Phyllogomphus selysi*	*Pseudagrion massaicum*	*Trithemis werneri*
Orthetrum caffrum	*Phyllomacromia monoceros*	*Pseudagrion nubicum*	*Umma declivium*
Orthetrum chrysostigma	*Phyllomacromia picta*	*Pseudagrion spernatum*	*Urothemis assignata*
Orthetrum hintzi	*Pinheyschna meruensis*	*Pseudagrion sublacteum*	*Urothemis edwardsii*
Orthetrum julia	*Pinheyschna rileyi*	*Rhyothemis semihyalina*	*Zosteraeschna usambarica*
Orthetrum machadoi	*Platycypha auripes*	*Tetrathemis polleni*	*Zygonoides fuelleborni*
Orthetrum stemmale	*Platycypha caligata*	*Tholymis tillarga*	*Zygonyx natalensis*
Orthetrum trinacria	*Proischnura subfurcata*	*Tramea basilaris*	*Zygonyx torridus*
Palpopleura lucia	*Pseudagrion acaciae*	*Trithemis aconita*	
Palpopleura portia	*Pseudagrion bicoerulans*	*Trithemis annulata*	

FW569: Okavango (105 species, 6 912 records)

Species	Species	Species	Species
Aciagrion steeleae	*Ceriagrion katamborae*	*Lestinogomphus angustus*	*Paragomphus sabicus*
Acisoma inflatum	*Ceriagrion suave*	*Lestinogomphus silkeae*	*Parazyxomma flavicans*
Aethiothemis solitaria	*Chalcostephia flavifrons*	*Mesocnemis singularis*	*Phaon iridipennis*
Aethriamanta rezia	*Crenigomphus kavangoensis*	*Nesciothemis farinosa*	*Phyllogomphus selysi*
Africallagma glaucum	*Crocothemis erythraea*	*Neurogomphus cocytius*	*Phyllomacromia contumax*
Africallagma subtile	*Crocothemis sanguinolenta*	*Olpogastra lugubris*	*Phyllomacromia picta*
Agriocnemis angolensis	*Diplacodes deminuta*	*Orthetrum brachiale*	*Pinheyagrion angolicum*
Agriocnemis exilis	*Diplacodes lefebvrii*	*Orthetrum caffrum*	*Platycypha caligata*
Agriocnemis gratiosa	*Diplacodes luminans*	*Orthetrum chrysostigma*	*Pseudagrion acaciae*
Agriocnemis ruberrima	*Elattoneura glauca*	*Orthetrum icteromelas*	*Pseudagrion assegaii*
Agriocnemis victoria	*Gomphidia quarrei*	*Orthetrum machadoi*	*Pseudagrion coeleste*
Anax bangweuluensis	*Hemistigma albipunctum*	*Orthetrum robustum*	*Pseudagrion deningi*
Anax ephippiger	*Ictinogomphus dundoensis*	*Orthetrum stemmale*	*Pseudagrion fisheri*
Anax imperator	*Ictinogomphus ferox*	*Orthetrum trinacria*	*Pseudagrion glaucescens*
Anax tristis	*Ischnura senegalensis*	*Palpopleura deceptor*	*Pseudagrion hamoni*
Azuragrion nigridorsum	*Lestes dissimulans*	*Palpopleura lucia*	*Pseudagrion helenae*
Brachythemis lacustris	*Lestes pallidus*	*Pantala flavescens*	*Pseudagrion massaicum*
Brachythemis leucosticta	*Lestes pinheyi*	*Paragomphus cataractae*	*Pseudagrion nubicum*
Brachythemis wilsoni	*Lestes plagiatus*	*Paragomphus cognatus*	*Pseudagrion rufostigma*
Bradinopyga cornuta	*Lestes tridens*	*Paragomphus elpidius*	*Pseudagrion sjoestedti*
Ceriagrion glabrum	*Lestes virgatus*	*Paragomphus genei*	*Pseudagrion sublacteum*

FW569: Okavango (*continued*)

Species	Species	Species	Species
Pseudagrion sudanicum	*Trithemis aconita*	*Trithemis kirbyi*	*Zygonoides fuelleborni*
Rhyothemis fenestrina	*Trithemis aequalis*	*Trithemis monardi*	*Zygonyx natalensis*
Rhyothemis semihyalina	*Trithemis annulata*	*Trithemis palustris*	*Zygonyx torridus*
Sympetrum fonscolombii	*Trithemis arteriosa*	*Trithetrum navasi*	
Tholymis tillarga	*Trithemis donaldsoni*	*Urothemis assignata*	
Tramea basilaris	*Trithemis hecate*	*Urothemis edwardsii*	

FW570: Kalahari (56 species, 638 records)

Species	Species	Species	Species
Africallagma glaucum	*Diplacodes lefebvrii*	*Orthetrum trinacria*	*Rhyothemis semihyalina*
Agriocnemis exilis	*Diplacodes luminans*	*Palpopleura deceptor*	*Sympetrum fonscolombii*
Agriocnemis gratiosa	*Ischnura senegalensis*	*Palpopleura jucunda*	*Tholymis tillarga*
Anax ephippiger	*Lestes dissimulans*	*Palpopleura lucia*	*Tramea basilaris*
Anax imperator	*Lestes pallidus*	*Palpopleura portia*	*Tramea limbata*
Anax tristis	*Lestes pinheyi*	*Pantala flavescens*	*Trithemis annulata*
Azuragrion nigridorsum	*Lestes tridens*	*Paragomphus cognatus*	*Trithemis arteriosa*
Brachythemis leucosticta	*Olpogastra lugubris*	*Paragomphus genei*	*Trithemis donaldsoni*
Bradinopyga cornuta	*Orthetrum abbotti*	*Phyllomacromia contumax*	*Trithemis hecate*
Ceriagrion glabrum	*Orthetrum brachiale*	*Pseudagrion coeleste*	*Trithemis kirbyi*
Ceriagrion suave	*Orthetrum caffrum*	*Pseudagrion hamoni*	*Trithemis monardi*
Crocothemis divisa	*Orthetrum chrysostigma*	*Pseudagrion kersteni*	*Trithetrum navasi*
Crocothemis erythraea	*Orthetrum julia*	*Pseudagrion massaicum*	*Urothemis edwardsii*
Crocothemis sanguinolenta	*Orthetrum robustum*	*Pseudagrion nubicum*	*Zygonyx torridus*

FW571: Southern Kalahari (39 species, 577 records)

Species	Species	Species	Species
Africallagma glaucum	*Diplacodes luminans*	*Pantala flavescens*	*Trithemis annulata*
Anax ephippiger	*Ictinogomphus ferox*	*Paragomphus genei*	*Trithemis arteriosa*
Anax imperator	*Ischnura senegalensis*	*Phyllomacromia picta*	*Trithemis donaldsoni*
Anax speratus	*Lestes pallidus*	*Pseudagrion assegaii*	*Trithemis furva*
Brachythemis leucosticta	*Orthetrum brachiale*	*Pseudagrion massaicum*	*Trithemis kirbyi*
Ceratogomphus pictus	*Orthetrum caffrum*	*Pseudagrion salisburyense*	*Trithemis stictica*
Ceriagrion glabrum	*Orthetrum chrysostigma*	*Pseudagrion sublacteum*	*Urothemis edwardsii*
Crocothemis erythraea	*Orthetrum julia*	*Rhyothemis semihyalina*	*Zosteraeschna minuscula*
Crocothemis sanguinolenta	*Orthetrum trinacria*	*Sympetrum fonscolombii*	*Zygonyx torridus*
Diplacodes lefebvrii	*Palpopleura deceptor*	*Tramea basilaris*	

FW572: Western Orange (32 species, 204 records)

Species	Species	Species	Species
Africallagma glaucum	*Lestes pallidus*	*Phyllomacromia picta*	*Sympetrum fonscolombii*
Anax imperator	*Mesocnemis singularis*	*Platycypha caligata*	*Tholymis tillarga*
Brachythemis leucosticta	*Nesciothemis farinosa*	*Pseudagrion acaciae*	*Trithemis annulata*
Crenigomphus hartmanni	*Orthetrum caffrum*	*Pseudagrion citricola*	*Trithemis arteriosa*
Crocothemis erythraea	*Orthetrum chrysostigma*	*Pseudagrion massaicum*	*Trithemis dorsalis*
Diplacodes lefebvrii	*Orthetrum trinacria*	*Pseudagrion salisburyense*	*Trithemis furva*
Ictinogomphus ferox	*Pantala flavescens*	*Pseudagrion sublacteum*	*Trithemis kirbyi*
Ischnura senegalensis	*Paragomphus genei*	*Pseudagrion vaalense*	*Trithemis werneri*

FW573: Karoo (20 species, 90 records)

Species	Species	Species	Species
Africallagma glaucum	*Ischnura senegalensis*	*Orthetrum trinacria*	*Trithemis annulata*
Anax imperator	*Lestes plagiatus*	*Pantala flavescens*	*Trithemis arteriosa*
Crocothemis erythraea	*Orthetrum caffrum*	*Pseudagrion citricola*	*Trithemis furva*
Crocothemis sanguinolenta	*Orthetrum chrysostigma*	*Pseudagrion massaicum*	*Trithemis kirbyi*
Elattoneura glauca	*Orthetrum julia*	*Sympetrum fonscolombii*	*Zosteraeschna minuscula*

FW574: Drakensberg – Maloti Highlands (48 species, 628 records)

Species	Species	Species	Species
Acisoma inflatum	*Crocothemis erythraea*	*Palpopleura jucunda*	*Pseudagrion kersteni*
Africallagma glaucum	*Crocothemis sanguinolenta*	*Pantala flavescens*	*Pseudagrion massaicum*
Africallagma sapphirinum	*Diplacodes lefebvrii*	*Paragomphus cognatus*	*Pseudagrion salisburyense*
Africallagma sinuatum	*Elattoneura glauca*	*Pinheyschna subpupillata*	*Pseudagrion spernatum*
Agriocnemis falcifera	*Ischnura senegalensis*	*Platycypha caligata*	*Sympetrum fonscolombii*
Agriocnemis pinheyi	*Lestes plagiatus*	*Platycypha fitzsimonsi*	*Syncordulia gracilis*
Allocnemis leucosticta	*Notogomphus praetorius*	*Proischnura rotundipennis*	*Tramea basilaris*
Anax ephippiger	*Orthetrum abbotti*	*Pseudagrion caffrum*	*Trithemis arteriosa*
Anax imperator	*Orthetrum caffrum*	*Pseudagrion citricola*	*Trithemis dorsalis*
Ceratogomphus pictus	*Orthetrum chrysostigma*	*Pseudagrion commoniae*	*Trithemis furva*
Chlorolestes draconicus	*Orthetrum julia*	*Pseudagrion draconis*	*Trithemis stictica*
Chlorolestes fasciatus	*Orthetrum machadoi*	*Pseudagrion hageni*	*Zosteraeschna minuscula*

FW575: Southern Temperate Highveld (125 species, 12 848 records)

Species	Species	Species	Species
Acisoma inflatum	*Africallagma glaucum*	*Agriocnemis exilis*	*Agriocnemis pinheyi*
Acisoma variegatum	*Africallagma sapphirinum*	*Agriocnemis falcifera*	*Allocnemis leucosticta*
Africallagma fractum	*Africallagma sinuatum*	*Agriocnemis gratiosa*	*Anaciaeschna triangulifera*

FW575: Southern Temperate Highveld (*continued*)

Species	Species	Species	Species
Anax ephippiger	*Lestes pallidus*	*Paragomphus genei*	*Pseudagrion sudanicum*
Anax imperator	*Lestes plagiatus*	*Phaon iridipennis*	*Pseudagrion vaalense*
Anax speratus	*Lestes tridens*	*Phyllogomphus selysi*	*Rhyothemis semihyalina*
Anax tristis	*Lestes virgatus*	*Phyllomacromia contumax*	*Sympetrum fonscolombii*
Azuragrion nigridorsum	*Lestinogomphus angustus*	*Phyllomacromia monoceros*	*Tetrathemis polleni*
Brachythemis lacustris	*Mesocnemis singularis*	*Phyllomacromia picta*	*Tholymis tillarga*
Brachythemis leucosticta	*Metacnemis valida*	*Pinheyschna subpupillata*	*Tramea basilaris*
Bradinopyga cornuta	*Nesciothemis farinosa*	*Platycypha caligata*	*Tramea limbata*
Ceratogomphus pictus	*Notiothemis jonesi*	*Platycypha fitzsimonsi*	*Trithemis aconita*
Ceriagrion glabrum	*Notogomphus praetorius*	*Proischnura rotundipennis*	*Trithemis annulata*
Chlorolestes apricans	*Olpogastra lugubris*	*Pseudagrion acaciae*	*Trithemis arteriosa*
Chlorolestes draconicus	*Onychogomphus supinus*	*Pseudagrion assegaii*	*Trithemis donaldsoni*
Chlorolestes elegans	*Orthetrum abbotti*	*Pseudagrion caffrum*	*Trithemis dorsalis*
Chlorolestes fasciatus	*Orthetrum caffrum*	*Pseudagrion citricola*	*Trithemis furva*
Chlorolestes tessellatus	*Orthetrum chrysostigma*	*Pseudagrion coeleste*	*Trithemis hecate*
Crenigomphus hartmanni	*Orthetrum guineense*	*Pseudagrion commoniae*	*Trithemis kirbyi*
Crocothemis divisa	*Orthetrum hintzi*	*Pseudagrion draconis*	*Trithemis pluvialis*
Crocothemis erythraea	*Orthetrum icteromelas*	*Pseudagrion gamblesi*	*Trithemis stictica*
Crocothemis sanguinolenta	*Orthetrum julia*	*Pseudagrion hageni*	*Urothemis assignata*
Diplacodes lefebvrii	*Orthetrum machadoi*	*Pseudagrion hamoni*	*Urothemis edwardsii*
Diplacodes luminans	*Orthetrum stemmale*	*Pseudagrion inopinatum*	*Zosteraeschna minuscula*
Diplacodes pumila	*Orthetrum trinacria*	*Pseudagrion kersteni*	*Zosteraeschna usambarica*
Elattoneura glauca	*Palpopleura deceptor*	*Pseudagrion makabusiense*	*Zygonoides fuelleborni*
Gomphidia quarrei	*Palpopleura jucunda*	*Pseudagrion massaicum*	*Zygonyx natalensis*
Gynacantha manderica	*Palpopleura lucia*	*Pseudagrion newtoni*	*Zygonyx torridus*
Hemistigma albipunctum	*Palpopleura portia*	*Pseudagrion salisburyense*	*Zyxomma atlanticum*
Ictinogomphus ferox	*Pantala flavescens*	*Pseudagrion sjoestedti*	
Ischnura senegalensis	*Paragomphus cognatus*	*Pseudagrion spernatum*	
Lestes dissimulans	*Paragomphus elpidius*	*Pseudagrion sublacteum*	

FW576: Zambezian Lowveld (151 species, 9 405 records)

Species	Species	Species	Species
Aciagrion dondoense	*Agriocnemis falcifera*	*Anax imperator*	*Ceriagrion suave*
Aciagrion gracile	*Agriocnemis gratiosa*	*Anax speratus*	*Ceriagrion whellani*
Acisoma inflatum	*Agriocnemis pinheyi*	*Anax tristis*	*Chalcostephia flavifrons*
Acisoma variegatum	*Agriocnemis ruberrima*	*Azuragrion nigridorsum*	*Chlorocypha consueta*
Aethriamanta rezia	*Allocnemis leucosticta*	*Brachythemis lacustris*	*Chlorolestes fasciatus*
Africallagma fractum	*Allocnemis marshalli*	*Brachythemis leucosticta*	*Chlorolestes tessellatus*
Africallagma glaucum	*Anaciaeschna triangulifera*	*Bradinopyga cornuta*	*Crenigomphus hartmanni*
Africallagma subtile	*Anax chloromelas*	*Ceratogomphus pictus*	*Crocothemis divisa*
Agriocnemis exilis	*Anax ephippiger*	*Ceriagrion glabrum*	*Crocothemis erythraea*

FW576: Zambezian Lowveld (*continued*)

Species	Species	Species	Species
Crocothemis sanguinolenta	*Nesciothemis farinosa*	*Parazyxomma flavicans*	*Pseudagrion sudanicum*
Crocothemis saxicolor	*Neurogomphus zambeziensis*	*Phaon iridipennis*	*Rhyothemis semihyalina*
Diplacodes lefebvrii	*Notiothemis jonesi*	*Phyllogomphus selysi*	*Sympetrum fonscolombii*
Diplacodes luminans	*Notogomphus praetorius*	*Phyllomacromia contumax*	*Tetrathemis polleni*
Diplacodes pumila	*Olpogastra lugubris*	*Phyllomacromia monoceros*	*Tholymis tillarga*
Elattoneura frenulata	*Onychogomphus supinus*	*Phyllomacromia picta*	*Tramea basilaris*
Elattoneura glauca	*Orthetrum abbotti*	*Pinheyschna rileyi*	*Tramea limbata*
Gomphidia quarrei	*Orthetrum brachiale*	*Pinheyschna subpupillata*	*Trithemis aconita*
Gynacantha manderica	*Orthetrum caffrum*	*Platycypha caligata*	*Trithemis annulata*
Gynacantha usambarica	*Orthetrum chrysostigma*	*Platycypha fitzsimonsi*	*Trithemis arteriosa*
Gynacantha villosa	*Orthetrum guineense*	*Proischnura rotundipennis*	*Trithemis donaldsoni*
Hadrothemis scabrifrons	*Orthetrum hintzi*	*Proischnura subfurcata*	*Trithemis dorsalis*
Hemicordulia africana	*Orthetrum icteromelas*	*Pseudagrion acaciae*	*Trithemis furva*
Hemistigma albipunctum	*Orthetrum julia*	*Pseudagrion assegaii*	*Trithemis hecate*
Ictinogomphus ferox	*Orthetrum machadoi*	*Pseudagrion citricola*	*Trithemis kirbyi*
Ischnura senegalensis	*Orthetrum monardi*	*Pseudagrion coeleste*	*Trithemis monardi*
Lestes amicus	*Orthetrum robustum*	*Pseudagrion commoniae*	*Trithemis pluvialis*
Lestes dissimulans	*Orthetrum stemmale*	*Pseudagrion gamblesi*	*Trithemis stictica*
Lestes ictericus	*Orthetrum trinacria*	*Pseudagrion glaucescens*	*Trithemis werneri*
Lestes ochraceus	*Palpopleura deceptor*	*Pseudagrion hageni*	*Urothemis assignata*
Lestes pallidus	*Palpopleura jucunda*	*Pseudagrion hamoni*	*Urothemis edwardsii*
Lestes plagiatus	*Palpopleura lucia*	*Pseudagrion kersteni*	*Urothemis luciana*
Lestes tridens	*Palpopleura portia*	*Pseudagrion lindicum*	*Zosteraeschna minuscula*
Lestes uncifer	*Pantala flavescens*	*Pseudagrion makabusiense*	*Zosteraeschna usambarica*
Lestes virgatus	*Paragomphus cognatus*	*Pseudagrion massaicum*	*Zygonoides fuelleborni*
Lestinogomphus angustus	*Paragomphus elpidius*	*Pseudagrion salisburyense*	*Zygonyx natalensis*
Macrodiplax cora	*Paragomphus genei*	*Pseudagrion sjoestedti*	*Zygonyx torridus*
Mesocnemis singularis	*Paragomphus magnus*	*Pseudagrion spernatum*	*Zyxomma atlanticum*
Microgomphus nyassicus	*Paragomphus sabicus*	*Pseudagrion sublacteum*	

FW577: Amatolo – Winterberg Highlands (47 species, 296 records)

Species	Species	Species	Species
Africallagma glaucum	*Chlorolestes apricans*	*Lestes virgatus*	*Phaon iridipennis*
Africallagma sapphirinum	*Chlorolestes fasciatus*	*Metacnemis valida*	*Pinheyschna subpupillata*
Agriocnemis falcifera	*Chlorolestes tessellatus*	*Nesciothemis farinosa*	*Platycypha caligata*
Allocnemis leucosticta	*Crenigomphus hartmanni*	*Notogomphus praetorius*	*Platycypha fitzsimonsi*
Anax ephippiger	*Crocothemis erythraea*	*Orthetrum caffrum*	*Pseudagrion caffrum*
Anax imperator	*Diplacodes lefebvrii*	*Orthetrum chrysostigma*	*Pseudagrion citricola*
Anax speratus	*Elattoneura glauca*	*Orthetrum julia*	*Pseudagrion hageni*
Ceratogomphus pictus	*Ischnura senegalensis*	*Orthetrum machadoi*	*Pseudagrion kersteni*
Ceriagrion glabrum	*Lestes plagiatus*	*Paragomphus cognatus*	*Pseudagrion massaicum*

FW577: Amatolo – Winterberg Highlands (*continued*)

Species	Species	Species	Species
Pseudagrion salisburyense	*Tramea basilaris*	*Trithemis furva*	*Zosteraeschna minuscula*
Pseudagrion spernatum	*Trithemis arteriosa*	*Trithemis kirbyi*	*Zygonyx natalensis*
Sympetrum fonscolombii	*Trithemis dorsalis*	*Trithemis stictica*	

FW578: Cape Fold (75 species, 3 866 records)

Species	Species	Species	Species
Africallagma glaucum	*Crocothemis sanguinolenta*	*Orthetrum trinacria*	*Spesbona angusta*
Africallagma sapphirinum	*Diplacodes lefebvrii*	*Palpopleura jucunda*	*Sympetrum fonscolombii*
Agriocnemis falcifera	*Ecchlorolestes nylephtha*	*Pantala flavescens*	*Syncordulia gracilis*
Allocnemis leucosticta	*Ecchlorolestes peringueyi*	*Paragomphus cognatus*	*Syncordulia legator*
Anaciaeschna triangulifera	*Elattoneura frenulata*	*Paragomphus genei*	*Syncordulia serendipator*
Anax imperator	*Elattoneura glauca*	*Phyllomacromia contumax*	*Syncordulia venator*
Anax speratus	*Ischnura senegalensis*	*Phyllomacromia picta*	*Tetrathemis polleni*
Anax tristis	*Lestes plagiatus*	*Pinheyschna subpupillata*	*Tramea basilaris*
Azuragrion nigridorsum	*Lestes virgatus*	*Platycypha caligata*	*Tramea limbata*
Brachythemis lacustris	*Metacnemis valida*	*Platycypha fitzsimonsi*	*Trithemis annulata*
Ceratogomphus pictus	*Nesciothemis farinosa*	*Proischnura polychromatica*	*Trithemis arteriosa*
Ceratogomphus triceraticus	*Notogomphus praetorius*	*Pseudagrion citricola*	*Trithemis dorsalis*
Ceriagrion glabrum	*Orthetrum abbotti*	*Pseudagrion draconis*	*Trithemis furva*
Chlorolestes conspicuus	*Orthetrum caffrum*	*Pseudagrion furcigerum*	*Trithemis kirbyi*
Chlorolestes fasciatus	*Orthetrum chrysostigma*	*Pseudagrion hageni*	*Trithemis pluvialis*
Chlorolestes tessellatus	*Orthetrum hintzi*	*Pseudagrion kersteni*	*Trithemis stictica*
Chlorolestes umbratus	*Orthetrum julia*	*Pseudagrion massaicum*	*Zosteraeschna minuscula*
Crenigomphus hartmanni	*Orthetrum machadoi*	*Pseudagrion salisburyense*	*Zygonyx natalensis*
Crocothemis erythraea	*Orthetrum rubens*	*Rhyothemis semihyalina*	

APPENDIX D5: The African countries with their respective terrestrial and freshwater ecoregions.

The African continent can be divided into political regions and biogeographical regions, both of which can act as conservation-action units. The political regions are 49 African countries, while the biogeographical regions are the 102 terrestrial (as described by Olson *et al.* 2001) and 78 freshwater ecoregions (as described by Abell *et al.* 2008). Listed below are all the African countries with their relevant terrestrial and freshwater ecoregions. Although the terrestrial ecoregions do describe the dragonfly species assemblages better than those of the freshwater ecoregions, both sets of ecoregions were included in these lists to provide a comprehensive description of the biogeographical regions of each country.

Algeria: (data: 60 species, 1 934 records; ecoregions: 8 terrestrial, 3 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
PA0513	Mediterranean Conifer and Mixed Forests	53	727
PA0905	Saharan Halophytics	26	675
PA1213	Mediterranean Dry Woodlands and Steppe	52	779
PA1214	Mediterranean Woodlands and Forests	64	4 745
PA1321	North Saharan Steppe and Woodlands	38	944
PA1327	Sahara Desert	33	748
PA1329	South Saharan Steppe and Woodlands	13	69
PA1332	West Saharan Montane Xeric Woodlands	19	364
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
502	Mediterranean Northwest Africa	62	4 112
503	Sahara	36	1 278
504	Dry Sahel	34	594

Angola: (data: 195 species, 2 181 records; ecoregions: 10 terrestrial, 6 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0701	Angolan Miombo Woodlands	112	1 156
AT0702	Angolan Mopane Woodlands	48	301
AT0704	Central Zambezian Miombo Woodlands	265	7 696
AT0718	Southern Congolian Forest-Savanna Mosaic	124	445
AT0723	Western Congolian Forest-Savanna Mosaic	261	9 149
AT0726	Zambezian Baikiaea Woodlands	115	2 385
AT1001	Angolan Montane Forest-Grassland Mosaic	34	94
AT1002	Angolan Scarp Savanna and Woodlands	29	52
AT1310	Kaokoveld Desert	13	39
AT1316	Namibian Savanna Woodlands	70	2 363

Angola: (*continued*)

Eco-code	Freshwater ecoregion names	Number of spp.	Number of records
546	Kasai	132	472
550	Lower Congo	53	70
551	Cuanza	155	1 092
552	Namib	74	3 322
553	Etosha	35	290
555	Zambezian Headwaters	197	2 597

Benin: (data: 92 species, 887 records; ecoregions: 3 terrestrial, 3 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0123	Nigerian Lowland Forests	86	208
AT0707	Guinean Forest-Savanna Mosaic	177	2 649
AT0722	West Sudanian Savanna	137	2 704
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
505	Lower Niger – Benue	170	1 359
516	Volta	143	1 342
517	Bight Drainages	140	1 456

Botswana: (data: 120 species, 6 566 records; ecoregions: 7 terrestrial, 6 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0709	Kalahari Acacia-Baikiaea Woodlands	88	957
AT0717	Southern Africa Bushveld	126	5 320
AT0725	Zambezian and Mopane Woodlands	174	8 616
AT0726	Zambezian Baikiaea Woodlands	115	2 385
AT0907	Zambezian Flooded Grasslands	139	4 594
AT0908	Zambezian Halophytics	23	68
AT1309	Kalahari Xeric Savanna	67	1 580
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
556	Upper Zambezi Floodplains	113	2 575
569	Okavango	105	6 912
570	Kalahari	56	638
571	Southern Kalahari	39	577
575	Southern Temperate Highveld	125	12 848
576	Zambezian Lowveld	151	9 405

Burkina Faso: (data: 59 species, 269 records; ecoregions: 2 terrestrial, 4 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0713	Sahelian Acacia Savanna	79	989
AT0722	West Sudanian Savanna	137	2 704
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
505	Lower Niger – Benue	170	1 359
507	Upper Niger	86	270
514	Eburneo	138	584
516	Volta	143	1 342

Burundi: (data: 11 species, 13 records; ecoregions: 2 terrestrial, 2 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0101	Albertine Rift Montane Forests	179	1 417
AT0704	Central Zambezian Miombo Woodlands	265	7 696
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
521	Lake Victoria Basin	211	4 422
542	Lake Tanganyika	165	1 004

Cameroon: (data: 213 species, 3 341 records; ecoregions: 11 terrestrial, 6 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0102	Atlantic Equatorial Coastal Forests	175	1 769
AT0103	Cameroonian Highlands Forests	105	910
AT0107	Cross-Sanaga-Bioko Coastal Forests	166	1 490
AT0121	Mount Cameroon and Bioko Montane Forests	22	32
AT0126	Northwestern Congolian Lowland Forests	198	2 474
AT0705	East Sudanian Savanna	135	458
AT0707	Guinean Forest-Savanna Mosaic	177	2 649
AT0710	Mandara Plateau Mosaic	15	40
AT0712	Northern Congolian Forest-Savanna Mosaic	207	730
AT0713	Sahelian Acacia Savanna	79	989
AT1401	Central African Mangroves	81	199
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
505	Lower Niger – Benue	170	1 359
518	Northern Gulf of Guinea Drainages	150	890
519	Western Equatorial Crater Lakes	136	1 386
520	Lake Chad	75	357
533	Southern Gulf of Guinea Drainages – Bioko	182	1 931
534	Sangha	116	422

Central African Republic: (data: 105 species, 385 records; ecoregions: 4 terrestrial, 3 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0124	Northeastern Congolian Lowland Forests	157	672
AT0126	Northwestern Congolian Lowland Forests	198	2 474
AT0705	East Sudanian Savanna	135	458
AT0712	Northern Congolian Forest-Savanna Mosaic	207	730
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
520	Lake Chad	75	357
534	Sangha	116	422
535	Sudanic Congo – Oubangi	148	684

Chad: (data: 45 species, 251 records; ecoregions: 8 terrestrial, 3 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0705	East Sudanian Savanna	135	458
AT0713	Sahelian Acacia Savanna	79	989
AT0904	Lake Chad Flooded Savanna	6	12
AT1303	East Saharan Montane Xeric Woodlands	20	92
AT9898	Lake: Afrotropic	124	460
PA1327	Sahara Desert	33	748
PA1329	South Saharan Steppe and Woodlands	13	69
PA1331	Tibesti-Jebel Uweinat Montane Xeric Woodlands	6	29
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
504	Dry Sahel	34	594
505	Lower Niger – Benue	170	1 359
520	Lake Chad	75	357

Congo, Republic of: (data: 156 species, 1 432 records; ecoregions: 4 terrestrial, 6 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0102	Atlantic Equatorial Coastal Forests	175	1 769
AT0126	Northwestern Congolian Lowland Forests	198	2 474
AT0129	Western Congolian Swamp Forests	142	949
AT0723	Western Congolian Forest-Savanna Mosaic	261	9 149
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
532	Ogooue – Nyanga – Kouilou – Niari	226	9 750
533	Southern Gulf of Guinea Drainages – Bioko	182	1 931
534	Sangha	116	422
535	Sudanic Congo – Oubangi	148	684
548	Malebo Pool	23	51
549	Lower Congo Rapids	85	344

Cote d'Ivoire (Ivory Coast): (data: 152 species, 785 records; ecoregions: 6 terrestrial, 5 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0111	Eastern Guinean Forests	163	1 759
AT0114	Guinean Montane Forests	147	1 760
AT0130	Western Guinean Lowland Forests	183	4 087
AT0707	Guinean Forest-Savanna Mosaic	177	2 649
AT0722	West Sudanian Savanna	137	2 704
AT1403	Guinean Mangroves	74	456
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
507	Upper Niger	86	270
512	Southern Upper Guinea	185	4 226
513	Mount Nimba	97	344
514	Eburneo	138	584
515	Ashanti	131	899

Democratic Republic of Congo: (data: 332 species, 6 044 records; ecoregions: 16 terrestrial, 18 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0101	Albertine Rift Montane Forests	179	1 417
AT0102	Atlantic Equatorial Coastal Forests	175	1 769
AT0104	Central Congolian Lowland Forests	49	117
AT0110	Eastern Congolian Swamp Forests	132	782
AT0124	Northeastern Congolian Lowland Forests	157	672
AT0129	Western Congolian Swamp Forests	142	949
AT0704	Central Zambezian Miombo Woodlands	265	7 696
AT0705	East Sudanian Savanna	135	458
AT0712	Northern Congolian Forest-Savanna Mosaic	207	730
AT0718	Southern Congolian Forest-Savanna Mosaic	124	445
AT0721	Victoria Basin Forest-Savanna Mosaic	194	3 195
AT0723	Western Congolian Forest-Savanna Mosaic	261	9 149
AT0907	Zambezian Flooded Grasslands	139	4 594
AT1013	Ruwenzori-Virunga Montane Moorlands	16	25
AT1401	Central African Mangroves	81	199
AT9898	Lake: Afrotropic	124	460
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
521	Lake Victoria Basin	211	4 422
522	Upper Nile	182	1 276
532	Ogooue – Nyanga – Kouilou – Niari	226	9 750
535	Sudanic Congo – Oubangi	148	684
536	Uele	174	501
537	Cuvette Centrale	168	1 099
538	Tumba	6	7

Democratic Republic of Congo: (*continued*)

Eco-code	Freshwater ecoregion names	Number of spp.	Number of records
539	Upper Congo Rapids	138	735
540	Upper Congo	136	402
541	Albertine Highlands	39	54
542	Lake Tanganyika	165	1 004
544	Bangweulu – Mweru	193	2 996
545	Upper Lualaba	180	1 024
546	Kasai	132	472
547	Mai Ndombe	16	24
549	Lower Congo Rapids	85	344
550	Lower Congo	53	70
555	Zambezian Headwaters	197	2 597

Djibouti: (data: 8 species, 20 records; ecoregions: 1 terrestrial, 3 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT1305	Ethiopian Xeric Grasslands and Shrublands	16	79
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
527	Western Red Sea Drainages	25	81
528	Northern Eastern Rift	69	273
529	Horn of Africa	26	111

Egypt: (data: 32 species, 1 211 records; ecoregions: 6 terrestrial, 5 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT1317	Red Sea Coastal Desert	8	19
PA0904	Nile Delta Flooded Savanna	26	431
PA0905	Saharan Halophytics	26	675
PA1213	Mediterranean Dry Woodlands and Steppe	52	779
PA1321	North Saharan Steppe and Woodlands	38	944
PA1327	Sahara Desert	33	748
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
503	Sahara	36	1 278
504	Dry Sahel	34	594
523	Lower Nile	27	398
524	Nile Delta	27	469
527	Western Red Sea Drainages	25	81

Equatorial Guinea: (data: 69 species, 108 records; ecoregions: 3 terrestrial, 2 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0102	Atlantic Equatorial Coastal Forests	175	1 769
AT0107	Cross-Sanaga-Bioko Coastal Forests	166	1 490
AT1401	Central African Mangroves	81	199
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
518	Northern Gulf of Guinea Drainages	150	890
533	Southern Gulf of Guinea Drainages – Bioko	182	1 931

Eritrea: (data: 20 species, 35 records; ecoregions: 5 terrestrial, 3 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0112	Ethiopian Montane Forests	77	306
AT0705	East Sudanian Savanna	135	458
AT0713	Sahelian Acacia Savanna	79	989
AT1007	Ethiopian Montane Grasslands and Woodlands	70	443
AT1305	Ethiopian Xeric Grasslands and Shrublands	16	79
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
523	Lower Nile	27	398
525	Ethiopian Highlands	75	386
527	Western Red Sea Drainages	25	81

Ethiopia: (data: 99 species, 1 000 records; ecoregions: 8 terrestrial, 8 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0112	Ethiopian Montane Forests	77	306
AT0705	East Sudanian Savanna	135	458
AT0711	Northern Acacia-Commiphora Bushlands and Thickets	128	1 456
AT0715	Somali Acacia-Commiphora Bushlands and Thickets	75	414
AT1007	Ethiopian Montane Grasslands and Woodlands	70	443
AT1008	Ethiopian Montane Moorlands	8	18
AT1305	Ethiopian Xeric Grasslands and Shrublands	16	79
AT1313	Masai Xeric Grasslands and Shrublands	10	17
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
522	Upper Nile	182	1 276
523	Lower Nile	27	398
525	Ethiopian Highlands	75	386
526	Lake Tana	29	72
527	Western Red Sea Drainages	25	81
528	Northern Eastern Rift	69	273
530	Lake Turkana	88	328
531	Shebelle – Juba	74	445

Gabon: (data: 223 species, 9 973 records; ecoregions: 4 terrestrial, 2 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0102	Atlantic Equatorial Coastal Forests	175	1 769
AT0126	Northwestern Congolian Lowland Forests	198	2 474
AT0723	Western Congolian Forest-Savanna Mosaic	261	9 149
AT1401	Central African Mangroves	81	199
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
532	Ogooue – Nyanga – Kouilou – Niari	226	9 750
533	Southern Gulf of Guinea Drainages – Bioko	182	1 931

Gambia: (data: 75 species, 1 337 records; ecoregions: 3 terrestrial, 1 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0707	Guinean Forest-Savanna Mosaic	177	2 649
AT0722	West Sudanian Savanna	137	2 704
AT1403	Guinean Mangroves	74	456
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
509	Senegal – Gambia	95	2 205

Ghana: (data: 167 species, 1 900 records; ecoregions: 3 terrestrial, 2 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0111	Eastern Guinean Forests	163	1 759
AT0707	Guinean Forest-Savanna Mosaic	177	2 649
AT0722	West Sudanian Savanna	137	2 704
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
515	Ashanti	131	899
516	Volta	143	1 342

Guinea-Bissau: (data: 64 species, 393 records; ecoregions: 2 terrestrial, 2 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0707	Guinean Forest-Savanna Mosaic	177	2 649
AT1403	Guinean Mangroves	74	456
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
509	Senegal – Gambia	95	2 205
511	Northern Upper Guinea	159	1 590

Guinea: (data: 107 species, 431 records; ecoregions: 3 terrestrial, 5 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0114	Guinean Montane Forests	147	1 760
AT0130	Western Guinean Lowland Forests	183	4 087
AT0707	Guinean Forest-Savanna Mosaic	177	2 649
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
507	Upper Niger	86	270
510	Fouta – Djalon	7	8
511	Northern Upper Guinea	159	1 590
512	Southern Upper Guinea	185	4 226
513	Mount Nimba	97	344

Kenya: (data: 163 species, 2 918 records; ecoregions: 11 terrestrial, 6 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0108	East African Montane Forests	75	268
AT0109	Eastern Arc Forests	97	471
AT0125	Northern Zanzibar-Inhambane Coastal Forest Mosaic	107	1 189
AT0711	Northern Acacia-Commiphora Bushlands and Thickets	128	1 456
AT0715	Somali Acacia-Commiphora Bushlands and Thickets	75	414
AT0716	Southern Acacia-Commiphora Bushlands and Thickets	89	191
AT0721	Victoria Basin Forest-Savanna Mosaic	194	3 195
AT1005	East African Montane Moorlands	13	18
AT1313	Masai Xeric Grasslands and Shrublands	10	17
AT1402	East African Mangroves	42	98
AT9898	Lake: Afrotropic	124	460
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
521	Lake Victoria Basin	211	4 422
530	Lake Turkana	88	328
531	Shebelle – Juba	74	445
566	Southern Eastern Rift	81	384
567	Tana, Athi & Coastal Drainages	126	1 875
568	Pangani	102	438

Lesotho: (data: 12 species, 15 records; ecoregions: 2 terrestrial, 2 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT1004	Drakensberg Montane Grasslands, Woodlands and Forests	121	6 284
AT1009	Highveld Grasslands	85	2 744
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
574	Drakensberg – Maloti Highlands	48	628
575	Southern Temperate Highveld	125	12 848

Liberia: (data: 185 species, 4 054 records; ecoregions: 2 terrestrial, 2 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0114	Guinean Montane Forests	147	1 760
AT0130	Western Guinean Lowland Forests	183	4 087
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
511	Northern Upper Guinea	159	1 590
512	Southern Upper Guinea	185	4 226

Libya: (data: 28 species, 309 records; ecoregions: 6 terrestrial, 2 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
PA0905	Saharan Halophytics	26	675
PA1213	Mediterranean Dry Woodlands and Steppe	52	779
PA1214	Mediterranean Woodlands and Forests	64	4 745
PA1321	North Saharan Steppe and Woodlands	38	944
PA1327	Sahara Desert	33	748
PA1332	West Saharan Montane Xeric Woodlands	19	364
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
503	Sahara	36	1 278
504	Dry Sahel	34	594

Malawi: (data: 144 species, 2 727 records; ecoregions: 8 terrestrial, 5 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0704	Central Zambezian Miombo Woodlands	265	7 696
AT0706	Eastern Miombo Woodlands	97	405
AT0719	Southern Miombo Woodlands	142	1 971
AT0725	Zambezian and Mopane Woodlands	174	8 616
AT0907	Zambezian Flooded Grasslands	139	4 594
AT1014	South Malawi Montane Forest-Grassland Mosaic	96	850
AT1015	Southern Rift Montane Forest-Grassland Mosaic	60	217
AT9898	Lake: Afrotropic	124	460
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
558	Middle Zambezi – Luangwa	145	1 819
559	Lake Malawi	139	1 862
561	Lower Zambezi	83	670
562	Mulanje	74	353
564	Coastal East Africa	135	1 291

Mali: (data: 71 species, 416 records; ecoregions: 3 terrestrial, 6 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0713	Sahelian Acacia Savanna	79	989
AT0722	West Sudanian Savanna	137	2 704
AT0903	Inner Niger Delta Flooded Savanna	12	48
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
504	Dry Sahel	34	594
505	Lower Niger – Benue	170	1 359
507	Upper Niger	86	270
508	Inner Niger Delta	19	137
509	Senegal – Gambia	95	2 205
516	Volta	143	1 342

Mauritania: (data: 24 species, 255 records; ecoregions: 6 terrestrial, 3 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0713	Sahelian Acacia Savanna	79	989
AT0722	West Sudanian Savanna	137	2 704
PA1304	Atlantic Coastal Desert	8	21
PA1321	North Saharan Steppe and Woodlands	38	944
PA1329	South Saharan Steppe and Woodlands	13	69
PA1332	West Saharan Montane Xeric Woodlands	19	364
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
503	Sahara	36	1 278
504	Dry Sahel	34	594
509	Senegal – Gambia	95	2 205

Morocco: (data: 60 species, 4 188 records; 7 terrestrial, 5 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
PA0513	Mediterranean Conifer and Mixed Forests	53	727
PA0904	Nile Delta Flooded Savanna	26	431
PA1010	Mediterranean High Atlas Juniper Steppe	6	17
PA1212	Mediterranean Acacia-Argania Dry Woodlands and Succulent Thickets	43	802
PA1213	Mediterranean Dry Woodlands and Steppe	52	779
PA1214	Mediterranean Woodlands and Forests	64	4 745
PA1321	North Saharan Steppe and Woodlands	38	994
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
501	Atlantic Northwest Africa	60	3 726
502	Mediterranean Northwest Africa	62	4 112
503	Sahara	36	1 278
504	Dry Sahel	34	594
523	Lower Nile	27	398

Mozambique: (data: 137 species, 1 956 records; ecoregions: 11 terrestrial, 7 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0119	Maputaland Coastal Forest Mosaic	109	1 847
AT0128	Southern Zanzibar-Inhambane Coastal Forest Mosaic	46	120
AT0706	Eastern Miombo Woodlands	97	405
AT0717	Southern Africa Bushveld	126	5 320
AT0719	Southern Miombo Woodlands	142	1 971
AT0725	Zambezian and Mopane Woodlands	174	8 616
AT0906	Zambezian Coastal Flooded Savanna	57	217
AT1006	Eastern Zimbabwe Montane Forest-Grassland Mosaic	107	809
AT1015	Southern Rift Montane Forest-Grassland Mosaic	60	217
AT1402	East African Mangroves	42	98
AT1405	Southern Africa Mangroves	73	680
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
558	Middle Zambezi – Luangwa	145	1 819
560	Zambezian Highveld	119	1 449
561	Lower Zambezi	83	670
562	Mulanje	74	353
563	Eastern Zimbabwe Highlands	120	1 381
564	Coastal East Africa	135	1 291
576	Zambezian Lowveld	151	9 405

Namibia: (data: 124 species, 8 024 records; ecoregions: 13 terrestrial, 9 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0702	Angolan Mopane Woodlands	48	301
AT0709	Kalahari Acacia-Baikiaea Woodlands	88	957
AT0725	Zambezian and Mopane Woodlands	174	8 616
AT0726	Zambezian Baikiaea Woodlands	115	2 385
AT0902	Etosha Pan Halophytics	23	109
AT0907	Zambezian Flooded Grasslands	139	4 594
AT1004	Drakensberg Montane Grasslands, Woodlands and Forests	121	6 284
AT1309	Kalahari Xeric Savanna	67	1 580
AT1310	Kaokoveld Desert	13	39
AT1314	Nama Karoo	57	610
AT1315	Namib Desert	23	172
AT1316	Namibian Savanna Woodlands	70	2 363
AT1322	Succulent Karoo	39	160

Namibia: (*continued*)

Eco-code	Freshwater ecoregion names	Number of spp.	Number of records
552	Namib	74	3 322
553	Etosha	35	290
554	Karstveld Sink Holes	48	373
556	Upper Zambezi Floodplains	113	2 575
569	Okavango	105	6 912
570	Kalahari	56	638
571	Southern Kalahari	39	577
572	Western Orange	32	204
575	Southern Temperate Highveld	125	12 848

Niger: (data: 30 species, 215 records; ecoregions: 4 terrestrial, 3 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0713	Sahelian Acacia Savanna	79	989
AT0722	West Sudanian Savanna	137	2 704
PA1327	Sahara Desert	33	748
PA1332	West Saharan Montane Xeric Woodlands	19	364
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
504	Dry Sahel	34	594
505	Lower Niger – Benue	170	1 359
520	Lake Chad	75	357

Nigeria: (data: 203 species, 1 606 records; ecoregions: 9 terrestrial, 5 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0103	Cameroonian Highlands Forests	105	910
AT0106	Cross-Niger Transition Forests	12	16
AT0107	Cross-Sanaga-Bioko Coastal Forests	166	1 490
AT0122	Niger Delta Swamp Forests	34	142
AT0123	Nigerian Lowland Forests	86	208
AT0707	Guinean Forest-Savanna Mosaic	177	2 649
AT0722	West Sudanian Savanna	137	2 704
AT1010	Jos Plateau Forest-Grassland Mosaic	89	264
AT1401	Central African Mangroves	81	199
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
505	Lower Niger – Benue	170	1 359
506	Niger Delta	44	164
517	Bight Drainages	140	1 456
518	Northern Gulf of Guinea Drainages	150	890
520	Lake Chad	75	357

Republic of South Africa: (data: 162 species, 25 682 records; ecoregions: 18 terrestrial, 9 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0115	Knysna-Amatole Montane Forests	43	610
AT0116	Kwazulu-Cape Coastal Forest Mosaic	100	1 555
AT0119	Maputaland Coastal Forest Mosaic	109	1 847
AT0709	Kalahari Acacia-Baikiaea Woodlands	88	957
AT0711	Northern Acacia-Commiphora Bushlands And Thickets	128	1 456
AT0717	Southern Africa Bushveld	126	5 320
AT0725	Zambezian And Mopane Woodlands	174	8 616
AT1003	Drakensberg Alti-Montane Grasslands And Woodlands	27	124
AT1004	Drakensberg Montane Grasslands, Woodlands And Forests	121	6 284
AT1009	Highveld Grasslands	85	2 744
AT1012	Maputaland-Pondoland Bushland And Thickets	93	881
AT1201	Albany Thickets	35	142
AT1202	Lowland Fynbos And Renosterveld	63	810
AT1203	Montane Fynbos And Renosterveld	68	2 104
AT1309	Kalahari Xeric Savanna	67	1 580
AT1314	Nama Karoo	57	610
AT1322	Succulent Karoo	39	160
AT1405	Southern Africa Mangroves	73	680
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
566	Southern Eastern Rift	81	384
571	Southern Kalahari	39	577
572	Western Orange	32	204
573	Karoo	20	90
574	Drakensberg – Maloti Highlands	48	628
575	Southern Temperate Highveld	125	12 848
576	Zambezian Lowveld	151	9 405
577	Amatolo – Winterberg Highlands	47	296
578	Cape Fold	75	3 866

Rwanda: (data: 41 species, 50 records; ecoregions: 3 terrestrial, 1 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0101	Albertine Rift Montane Forests	179	1 417
AT0721	Victoria Basin Forest-Savanna Mosaic	207	730
AT1013	Ruwenzori-Virunga Montane Moorlands	16	25
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
521	Lake Victoria Basin	211	4 422

Senegal: (data: 66 species, 671 records; ecoregions: 4 terrestrial, 1 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0707	Guinean Forest-Savanna Mosaic	177	2 649
AT0713	Sahelian Acacia Savanna	79	989
AT0722	West Sudanian Savanna	137	2 704
AT1403	Guinean Mangroves	74	456
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
509	Senegal – Gambia	95	2 205

Sierra Leone: (data: 155 species; 1 332 records; ecoregions: 4 terrestrial, 1 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0114	Guinean Montane Forests	147	1 760
AT0130	Western Guinean Lowland Forests	183	4 087
AT0707	Guinean Forest-Savanna Mosaic	177	2 649
AT1403	Guinean Mangroves	74	456
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
511	Northern Upper Guinea	159	1 590

Somalia: (data: 55 species, 371 records; ecoregions: 6 terrestrial, 4 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0112	Ethiopian Montane Forests	77	306
AT0125	Northern Zanzibar-Inhambane Coastal Forest Mosaic	107	1 189
AT0715	Somali Acacia-Commiphora Bushlands and Thickets	75	414
AT1305	Ethiopian Xeric Grasslands and Shrublands	16	79
AT1307	Hobyo Grasslands and Shrublands	10	13
AT1319	Somali Montane Xeric Woodlands	18	54
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
525	Ethiopian Highlands	75	386
528	Northern Eastern Rift	69	273
529	Horn of Africa	26	111
531	Shebelle – Juba	74	445

South Sudan: (data: 58 species, 167 records; ecoregions: 5 terrestrial, 1 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0108	East African Montane Forests	75	268
AT0705	East Sudanian Savanna	135	458
AT0712	Northern Congolian Forest-Savanna Mosaic	207	730
AT0713	Sahelian Acacia Savanna	79	989
AT0905	Saharan Flooded Grasslands	38	94
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
522	Upper Nile	182	1 276

Sudan: (data: 55 species, 558 records; ecoregions: 8 terrestrial, 5 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0112	Ethiopian Montane Forests	77	306
AT0712	Northern Congolian Forest-Savanna Mosaic	207	730
AT0713	Sahelian Acacia Savanna	79	989
AT0905	Saharan Flooded Grasslands	38	94
AT1303	East Saharan Montane Xeric Woodlands	20	92
AT1317	Red Sea Coastal Desert	8	19
PA1327	Sahara Desert	33	748
PA1329	South Saharan Steppe and Woodlands	13	69
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
504	Dry Sahel	34	594
520	Lake Chad	75	357
522	Upper Nile	182	1 276
523	Lower Nile	27	398
527	Western Red Sea Drainages	25	81

Swaziland: (data: 52 species, 237 records; ecoregions: 3 terrestrial, 2 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0119	Maputaland Coastal Forest Mosaic	109	1 847
AT0725	Zambezian and Mopane Woodlands	174	8 616
AT1004	Drakensberg Montane Grasslands, Woodlands and Forests	121	6 284
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
575	Southern Temperate Highveld	125	12 848
576	Zambezian Lowveld	151	9 405

Tanzania: (data: 174 species, 1 948 records; ecoregions: 15 terrestrial, 9 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0101	Albertine Rift Montane Forests	179	1 417
AT0108	East African Montane Forests	75	268
AT0109	Eastern Arc Forests	97	471
AT0125	Northern Zanzibar-Inhambane Coastal Forest Mosaic	107	1 189
AT0128	Southern Zanzibar-Inhambane Coastal Forest Mosaic	46	120
AT0704	Central Zambezian Miombo Woodlands	265	7 696
AT0706	Eastern Miombo Woodlands	97	405
AT0711	Northern Acacia-Commiphora Bushlands and Thickets	128	1 456
AT0714	Serengeti Volcanic Grasslands	2	2
AT0716	Southern Acacia-Commiphora Bushlands and Thickets	89	191
AT0907	Zambezian Flooded Grasslands	139	4 594
AT1005	East African Montane Moorlands	13	18
AT1015	Southern Rift Montane Forest-Grassland Mosaic	60	217
AT1402	East African Mangroves	42	98
AT9898	Lake: Afrotropic	124	460
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
521	Lake Victoria Basin	211	4 422
542	Lake Tanganyika	165	1 004
543	Malagarasi – Moyowosi	22	24
559	Lake Malawi	139	1 862
564	Coastal East Africa	135	1 291
565	Lake Rukwa	50	85
566	Southern Eastern Rift	81	384
567	Tana, Athi & Coastal Drainages	126	1 875
568	Pangani	102	438

Togo: (data: 91 species, 477 records; ecoregions: 3 terrestrial, 2 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0111	Eastern Guinean Forests	163	1 759
AT0707	Guinean Forest-Savanna Mosaic	177	2 649
AT0722	West Sudanian Savanna	137	2 704
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
516	Volta	143	1 342
517	Bight Drainages	140	1 456

Tunisia: (data: 54 species, 2 444 records; ecoregions: 5 terrestrial, 2 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
PA0513	Mediterranean Conifer and Mixed Forests	53	727
PA0905	Saharan Halophytics	26	675
PA1213	Mediterranean Dry Woodlands and Steppe	52	779
PA1214	Mediterranean Woodlands and Forests	64	4 754
PA1321	North Saharan Steppe and Woodlands	38	944
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
502	Mediterranean Northwest Africa	62	4 112
503	Sahara	36	1 278

Uganda: (data: 213 species, 4 599 records; ecoregions: 10 terrestrial, 4 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0101	Albertine Rift Montane Forests	179	1 417
AT0108	East African Montane Forests	75	268
AT0705	East Sudanian Savanna	135	458
AT0711	Northern Acacia-Commiphora Bushlands and Thickets	128	1 456
AT0712	Northern Congolian Forest-Savanna Mosaic	207	730
AT0721	Victoria Basin Forest-Savanna Mosaic	194	3 195
AT0905	Saharan Flooded Grasslands	38	94
AT1005	East African Montane Moorlands	13	18
AT1013	Ruwenzori-Virunga Montane Moorlands	16	25
AT9898	Lake: Afrotropic	124	460
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
521	Lake Victoria Basin	211	4 422
522	Upper Nile	182	1 276
530	Lake Turkana	88	328
536	Uele	174	501

Western Sahara: (data: 6 species, 11 records; ecoregions: 2 terrestrial, 2 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
PA1304	Atlantic Coastal Desert	8	21
PA1321	North Saharan Steppe and Woodlands	38	944
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
501	Atlantic Northwest Africa	60	3 726
503	Sahara	36	1 278

Zambia: (data: 224 species, 5 304 records; ecoregions: 9 terrestrial, 11 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0203	Zambezian Cryptosepalum Dry Forests	2	2
AT0704	Central Zambezian Miombo Woodlands	265	7 696
AT0708	Itigi-Sumbu Thicket	1	2
AT0713	Sahelian Acacia Savanna	79	989
AT0719	Southern Miombo Woodlands	142	1 971
AT0725	Zambezian and Mopane Woodlands	174	8 616
AT0907	Zambezian Flooded Grasslands	139	4 594
AT1015	Southern Rift Montane Forest-Grassland Mosaic	60	217
AT9898	Lake: Afrotropic	124	460
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
522	Upper Nile	182	1 276
540	Upper Congo	136	104
542	Lake Tanganyika	165	1 004
544	Bangweulu – Mweru	193	2 996
545	Upper Lualaba	180	1 024
555	Zambezian Headwaters	197	2 597
556	Upper Zambezi Floodplains	113	2 575
557	Kafue	73	323
558	Middle Zambezi – Luangwa	145	1 819
561	Lower Zambezi	83	670
565	Lake Rukwa	50	85

Zimbabwe: (data: 153 species, 4 182 records; ecoregions: 5 terrestrial, 6 freshwater)

Eco-code	Terrestrial ecoregion names	Number of spp.	Number of records
AT0717	Southern Africa Bushveld	126	5 320
AT0719	Southern Miombo Woodlands	142	1 971
AT0725	Zambezian and Mopane Woodlands	174	8 616
AT0726	Zambezian Baikiaea Woodlands	115	2 385
AT1006	Eastern Zimbabwe Montane Forest-Grassland Mosaic	107	809
Eco-code	**Freshwater ecoregion names**	**Number of spp.**	**Number of records**
556	Upper Zambezi Floodplains	113	2 575
558	Middle Zambezi – Luangwa	145	1 819
560	Zambezian Highveld	119	1 449
563	Eastern Zimbabwe Highlands	120	1 381
570	Kalahari	56	638
576	Zambezian Lowveld	151	9 405

CHAPTER 6:
GENERAL CONCLUSION

Following from the extensive discussions in chapters 2 to 5, the following general conclusions are made:

6.1 Dragonflies as a bioindicator group

Dragonflies (Odonata: Anisoptera and Zygoptera) are excellent indicators of the health and ecological integrity of freshwater ecosystems (e.g. Clark & Samways 1996; Samways 2005; Smith *et al.* 2007; Oertli 2008; Silva *et al.* 2010; Simaika & Samways 2011; Kutcher & Bried 2014; Chovanec *et al.* 2015; De Olieveira-Junior *et al.* 2015; Dutra & De Marco 2015; Golfieri *et al.* 2016; Martín & Maynou 2016; Valente-Neto *et al.* 2016). The reason for their suitability as an assessment tool is that they have suites of species with a range of sensitivities and traits, which can characterize any particular water body type, including large lakes, fast moving rivers, mud pools and artificial irrigation dams. This means that a change in species assemblages indicates some change in the condition of a water body (Samways & Simaika 2016). This is because dragonflies are sensitive to changing habitat structure and condition (Samways & Sharratt 2010), as well as in-water conditions (Kietzka *et al.* 2017). In addition, dragonflies are relatively easy to identify in the field, as they are taxonomically well known and conspicuous (Corbet 1999; Kalkman *et al.* 2008).

In South Africa, dragonflies have been widely used as a freshwater biomonitoring tool, the Dragonfly Biotic Index (DBI), to rapidly assess any changes in freshwater conditions (Samways & Taylor 2004; Simaika & Samways 2009, 2011, 2012; Samways & Simaika 2016). This biotic index is based on the presence of specific dragonfly species (both true dragonflies and damselflies) at focal sites. Each species has its own DBI score, which is derived from the total of three sub-indices: 1) the species' geographical distribution, 2) its International Union for the Conservation of Nature/Species Survival Commission (IUCN/SSC) Red List threat status, and 3) its sensitivity to anthropogenic disturbance to its habitat. The scores of each of these DBI sub-indices range from 0 – 3, with the final DBI value of each species being the sum of scores for the three sub-indices, and ranging from 0 – 9. Since the inception of the DBI, it has been found to be effective in monitoring freshwater biodiversity (Simaika & Samways 2012; Samways & Simaika 2016).

6.2 Developing the African Dragonfly Biotic Index (ADBI) (see Chapter 2)

The effectiveness of the DBI in South Africa led to the decision to spatially scale up this biomonitoring tool to encompass the entire African continent. This was made possible by the

considerable spatial and threat information gathered by the IUCN/SSC on certain aquatic taxa (i.e. fish, freshwater molluscs, dragonflies, crabs and aquatic plants) occurring in the freshwater ecosystems across the African mainland (Darwall *et al.* 2011). This large-scale assessment enabled the development of a substantial database of dragonfly species across the continent (e.g. Kipping *et al.* 2009; Dijkstra *et al.* 2011; Clausnitzer *et al.* 2012). Therefore, using the South African DBI as a template, and the collated pan-Africa dragonfly species data (Kipping *et al.* 2009), a biomonitoring tool was created for the entire African continent, i.e. the African Dragonfly Biotic Index (ADBI). As with the South African DBI, the ADBI also consists of three sub-indices, i.e. 1) the species' geographical distribution, 2) its IUCN/SSC Red List threat status, and 3) its vulnerability to anthropogenic disturbances affecting its habitat. Furthermore, any one species has a sub-index score ranging from 0 – 3, and, adding the three sub-index scores together, can have a total ADBI score of 0 – 9. Subsequently, with the available data it was possible to create suitable ADBI scores (0 – 9) for 604 African dragonflies.

However, as the ADBI was created for continent-level assessment of freshwater bodies, it was necessary to assess each of the three sub-indices at this large spatial scale. Therefore, the way that the scoring of these three sub-indices was achieved had to be changed. Thus: 1) the scoring for the species' IUCN/SSC Red List threat status was done only at the global scale (i.e. as is also the case with the South African DBI, but excluding the use of national Red List threat statuses that are used for the DBI), 2) its geographical distribution was determined at the continental scale (African continent), and 3) the species' vulnerability to anthropogenic disturbance was also assessed at a continental scale, i.e. measuring the adverse anthropogenic impacts to the species' preferred habitat and its possible reactions (African continent). The three sub-indices of the ADBI were calculated as follows:

- The ADBI geographical distribution sub-index was calculated using the spatial database of individually recorded dragonfly species across the African continent (Odonata Database of Africa or ODA) that was collated by Kipping *et al.* (2009). The geographical coordinates recorded within this database were used to determine the latitude-longitude range sizes of all selected species across Africa, and these range sizes were divided into four categories represented by the sub-scores 0 – 3.
- The ADBI Red List threat status sub-index was determined using the global IUCN/SSC Red List threat status as described by the IUCN Red List Categories and Criteria, version 3.1, second edition (IUCN 2016). These Red List threat statuses were also divided into four categories represented by the sub-scores 0 – 3. The Red List threat status for each species was obtained from the website www.iucnredlist.org.

- The ADBI species vulnerability sub-index was determined using a habitat matrix, the African Dragonfly Habitat Matrix (ADHM), created by 15 African dragonfly specialists who described the preference of each dragonfly species for a particular habitat. This sub-index represents the vulnerability of each species' habitat to specific anthropogenic disturbances (i.e. habitat conversion, water management and the presence of invasive alien trees), and secondly, the vulnerability of each species to these impacts within their particular habitats. The vulnerability sub-index was also divided into four categories representing the sub-scores 0 – 3.

6.3 Comparing national and continental dragonfly biotic indices (see Chapter 3)

These changes in calculating the sub-indices resulted in the ADBI scores deviating slightly from those of the original South African DBI scores. To determine how far the ADBI scores deviated from those of the South African DBI, the three sub-index scores, as well as the full scores of these two indices, were compared with each other using the 162 dragonfly species recorded within South Africa. Furthermore, the null hypothesis, the ADBI had a one-to-one relationship with the South African DBI, was accepted. Thus, the continental ADBI had a strong relationship with the South African DBI. However, it was found that of the three sub-indices, the second sub-index (Red List threat status) had the least differences between the threat status for the DBI (national and/or global) and ADBI (global). The few species that had lower ADBI Red List threat status sub-index scores are classified with higher national (DBI) than global threat statuses. The other two sub-indices, geographical distribution (sub-index 1) and habitat sensitivity/species vulnerability (sub-index 3: DBI/ADBI), had the most differences between the sub-index scores of these two indices, both of which had more lower and a few higher ADBI sub-index scores.

For the geographical distribution sub-index scores, those South African species with lower ADBI sub-index scores, can be generally classified as tropical species with distributions that spill over the South African border, while they are considered to be more common in central Africa. Also, the few species that had higher ADBI geographical distribution sub-index scores, are classified as common and/or localised throughout South Africa and southern Africa, while according to the categorised ADBI latitude-longitude range sizes, these species have a narrower distribution range across the African continent. For those South African species that are sensitive to habitat disturbances according to the DBI scores, are not as vulnerable to anthropogenic disturbances as suggested by their ADBI species vulnerability scores (low ADBI sub-index scores). On the other hand, those South African species that show very little sensitivity to habitat disturbance are vulnerable to anthropogenic disturbances according to the ADBI species vulnerability scores (high ADBI sub-index scores).

The veracity of the third sub-index of the ADBI, and how it influenced the final ADBI scores, could be tested by replacing the sub-index scores of the species vulnerability sub-index of the ADBI

with the sub-index scores of the habitat sensitivity sub-index of the DBI. In other words, the original DBI scores for the 162 species were compared with new ADBI scores, which includes ADBI sub-index 1 (geographical distribution) and sub-index 2 (threat status) plus DBI sub-index 3 (habitat sensitivity). This change revealed that the scoring between the original DBI scores and the new ADBI scores are closer together. Thus, the habitat sensitivity sub-index is more robust than that of the species vulnerability sub-index. Furthermore, as the species vulnerability sub-index is subjective (assessments having been determined by expert opinion), more information on the various species habitat preferences and conditions are needed to improve the quality of the matrix dataset, the African Dragonfly Habitat Matrix (ADHM).

6.4 Development of potential national Dragonfly Biotic Indices (see Chapter 4)

The African Dragonfly Biotic Index (ADBI) was created to assist freshwater managers with conservation planning that may preserve or restore the different freshwater ecosystems within Africa. However, conservation planning is typically based on conservation-action units, which can be heavily influenced by the political boundaries of those countries. Therefore, using the ADBI, which was created on a continental scale, for any conservation action regarding the freshwater ecosystems within any particular country, may be influenced by the political boundaries of those countries. To overcome this challenge, and to better assist freshwater managers in future to conserve these ecosystems, the ADBI (continental scale) must be modified to a national scale, i.e. creating Dragonfly Biotic Index (DBI) scores of 0 – 9 for each dragonfly species for each country. However, the null hypothesis, that each African country (48) had an equal opportunity to create national DBI scores, was rejected

Evaluating the data of each of the 48 African countries (i.e. distribution range, extent of Red List threat statuses and the range of ADBI scores) provided some insight into which countries have the necessary data available to create their own national DBIs and those that do not. The 48 African countries can be divided into two groups, i.e. those with a strong data coverage (i.e. a large number of recorded species, a strong range of Red list threat statuses, and a strong range of ADBI scores) and those with poor data coverage (i.e. a low number of recorded species, a weak range of Red list threat statuses, and a weak range of ADBI scores). The 24 countries with strong data coverage, have the basic data to start creating their own national DBIs. However, the development of their own national DBIs would always be improved through gathering of more data. The other 24 countries, with weak data coverage, will need, in many cases, extensive field exploration before they will be able to create their own national DBIs. However, some countries are perhaps not well suited for creating their own national DBIs as they are overall too arid (e.g. Egypt, Algeria and Morocco), although it may be possible that they could develop local DBIs in their wetter zones, e.g. the Nile in Egypt.

In terms of the second sub-index (Red List threat status), all 48 countries will still need to develop their own *national* Red List threat statuses for their recorded dragonfly species. The reason for this is that some species that may be classified as, for example, 'Near Threatened' on a global scale, may be more threatened on a national scale. This will make their own national DBIs much more effective, as is the case with the South African DBI. Also, as shown in the previous section, it is advisable that each of these 48 countries should develop their own habitat sensitivity sub-indices (similar to that of the South African DBI, i.e. natural versus human-modified habitats and their sensitivity to habitat change), rather than using the vulnerability sub-index of the ADBI. This is a far more objective approach than using the vulnerability sub-index, as the habitat sensitivity sub-index is based on actual presence/absence records of dragonflies in water bodies ranging from fully natural to highly transformed areas (Samways and Simaika 2016).

6.5 Development of potential regional Dragonfly Biotic Indices (see Chapter 5)

Conservation planning is not just designed according to political borders of countries, but can also be considered according to the biogeographical regions of a country or continent. The ADBI scores (0 – 9) were examined in detail according to the political borders of the African countries and as a result, the ADBI was adjusted to be more effective at the spatial level of national borders. However, as with conservation in general, what is expedient at the national level, usually does not match well with ecological processes and the patterns of biodiversity (Olson & Dinerstein 1998). Hence, another effective conservation tool is to use biogeographical categories, such as ecoregions. Consequently, the value of the ADBI for assessing the health and diversity of African freshwater ecosystems were examined according to ecoregions, which is a finer spatial scale and therefore, a more accurate assessment method than the ADBI continental index. These ecoregions include both terrestrial (determined by Olson *et al.* 2001) and freshwater (determined by Abell *et al.* 2008) ecoregions, which were established according to the global biodiversity of these two sets of ecoregions.

Evaluating the data according to the terrestrial and freshwater ecoregions (i.e. range extent of species distribution and ADBI scores 0 – 9 within the ecoregions), have shown that there was a similarity between the dragonfly species assemblages for the terrestrial and freshwater ecoregions. These two ecoregion sets also showed a strong significant correlation between the total ADBI scores and species recorded within their borders. Consequently, the null hypothesis, both the terrestrial and freshwater ecoregions had equal value according to the species composition and therefore, the recorded ADBI scores (0 – 9), was accepted. This means that when assessing the health and diversity of freshwater ecosystems from a regional perspective, the two approaches, terrestrial or freshwater ecoregions, have equal value. However, according to previous studies (e.g. Clausnitzer *et al.* 2009), terrestrial ecoregions are the best at describing dragonfly species assemblages.

The terrestrial ecoregions, as described by Olson *et al.* (2001), were delineated according to the habitat classifications that fall within the 14 biomes that represent the world. The vegetation compositions of these habitats are an important indicator of the presence of insects, as different insects associate with different vegetation communities (Panzer & Schwartz 1998; Wright & Samways 1998; Olsen *et al.* 2001). This is the same with the presence of dragonflies, as dragonflies are related to specific vegetation communities, i.e. forested landscapes will have different dragonfly species than a savanna landscape (Samways & Simaika 2016; also shown in the habitat matrix ADHM). This means that terrestrial ecoregions are preferable over freshwater ones, despite dragonflies being predominately freshwater organisms. The ecological reason behind this is that these insects, as with many other freshwater animals, in general, have highly specific habitat requirements. This means that they are often associated with certain habitat types that are elevation dependent, and therefore, have a particular set of abiotic (e.g. water temperature, flow rate, water chemistry) and biotic conditions (e.g. in and out of water plant composition and structure, prey type and availability). Also, overall, there were more terrestrial vs. freshwater ecoregions across the continent, which may lead to greater sensitivity as in effect there are more pixels.

On the other hand, the freshwater ecoregions were established according to the distribution and composition of the world's freshwater fish species (Abell *et al.* 2008). Accordingly, these ecoregions are a function of various filters, such continental-scale filters (mountains and glaciers of the past) that define large biogeographical patterns, regional-scale filters (climatic patterns and dispersal barriers such as catchments), and sub-regional and fine-scale filters (macrohabitats). The filter that is particularly distinctive of freshwater ecoregions, are the dispersal barriers (i.e. catchments or watersheds) as their hydrological processes influence freshwater species, whether or not they are confined to the freshwater environment. This has a similar conceptual base as the River Continuum Concept (RCC), which describes how biological communities react to physical changes along the length of a river, from the source to the mouth (Vannote *et al.* 1980).

For example, in eastern KwaZulu-Natal the genus *Pseudagrion* has a distinctive latitudinal (as the rivers run from east to west) and elevational spread of species (within five sections) across the freshwater system (Samways 2008). In section 1 of the rivers, the source of the system, the species *P. caffrum* (1 400 – 2 200 m elevation) and *P. spernatum* (800 – 2 000 m elevation) occur. In section 2, *P. inopinatum* (1 000 m elevation) occurs, while in section three, about mid-way of the system, *P. gamblesi* (700 – 1 400 m elevation) and *P. sublacteum* (up to 700 m elevation) occur. Then in section 4, there is *P. kersteni* (50 – 1 600 m elevation) and *P. massaicum* (rarely above 1 400 m elevation), and in section 5, near the mouth of the system, *P. commoniae* (up to 700 m elevation) and *P. acaciae* (below 300 m) occur. There is some overlap of species within and among the sections, while species such as *P. caffrum* and *P. acaciae*, for example, will never overlap. Also, *P. salisburyense* occurs

nearly across most of the system (200 – 1 600 m elevation), while species such as *P. citricola* (1 200 – 1 500 m) and *P. coeleste* occur within pools at specific elevations. In this context, using the dragonfly assemblages and their corresponding ADBI scores (0 – 9), according to the freshwater ecoregions, may be useful for freshwater managers. However, it has been demonstrated that catchments (i.e. from the source all the way to the lower reaches) are predisposed to overestimate the distribution of dragonfly species and include large areas of land that do not represent the species' habitat requirements (Simaika & Samways 2010). Therefore, in this context, using the freshwater ecoregions to described species assemblages and thus, the ADBI, may be problematic.

Where there are not enough data for developing a national DBI according to the national borders of the African countries, there are some areas on the continent where a local DBI could be developed using terrestrial ecoregions instead, assuming no gathering of further data to develop a national DBI. Thus, countries that have few recorded species within their borders (i.e. those that fall within the fourth quartile as assessed in Chapter 4) can use the data documented according to the ecoregions that described their biogeographical environment, e.g. Chad has 45 recorded species and 251 records, but can also be assessed according to the species and records documented in the eight terrestrial and three freshwater ecoregions that describe its biogeographical environment. Also, some countries have a better description of species assemblages, but have a limited species distribution range as the areas consist of mostly desert or semi-desert areas, but could use ecoregion data to create a regional bioassessment of their freshwater systems, e.g. Libya and Egypt. For example, the terrestrial ecoregion, Nile Delta Flooded Savanna, could be used to develop its own regional DBI. As freshwater systems are so threatened in both Africa and elsewhere this would an expedient way to get started on freshwater assessment and monitoring schemes.

REFERENCES

Abell, R., Thieme, M.L., Revenga, C., Bryer, M., Kottelat, M., Bogutskaya, N., Coad, B., Mandrak, N., Balderas, S.C., Bussing, W., Stiassny, M.L.J., Skelton, P., Allen, G.R., Unmack, P., Naseka, A., Ng, R., Sindorf, N., Robertson, J., Armijo, E., Higgins, J.V., Heibel, T.J., Wikramanayake, E., Olson, D., López, H.L., Reis, R.E., Lundberg, J.G., Sabaj Pérez, M.H. and Petry, P. 2008. Freshwater ecoregions of the World: A new map of biogeographic units for freshwater biodiversity conservation. *BioScience* **58**: 403-414.

Chovanec, A., Schindler, M, Waringer, J. and Wimmer, R. 2015. The Dragonfly Association Index (Insecta: Odonata) – A tool for the type-specific assessment of lowland rivers. *River Research and Applications* **31**: 627-638.

Clark, T.E. and Samways, M.J. 1996. Dragonflies (Odonata) as indicators of biotope quality in the Kruger National Park, South Africa. *Journal of Applied Ecology* **33**: 1001-1012.

Clausnitzer, V., Dijkstra, K.-D.B., Koch, R., Boudot, J.-P., Darwall, W.R.T., Kipping, J., Samraoui, B., Samways, M.J., Simaika, J.P. and Suhling, F. 2012. Focus on African freshwaters: hotspots of dragonfly diversity and conservation concerns. *Frontiers in Ecology and the Environment* **10**: 129-134.

Clausnitzer, V., Kalkman, V.J., Ram, M., Collen, B., Baillie, J.E.M., Bedjanič, M., Darwall, W.R.T., Dijkstra, K.-D.B., Dow, R., Hawking, J., Karube, H., Malikova, E., Paulson, D., Schütte, K., Suhling, F., Villanueva, R.J., Von Ellenrieder, N. and Wilson, K. 2009. Odonata enter the biodiversity crisis debate: The first global assessment of an insect group. *Biological Conservation* **142**: 1864-1869.

Corbet, P.S. 1999. *Dragonflies: Behaviour and Ecology of Odonata*. Harley Books, Colchester, UK.

Darwall, W.R.T., Smith, K.G., Allen, D.J., Holland, R.A., Harrison, I.J. and Brooks, E.G.E. (eds.). 2011. *The Diversity of Life in African Freshwaters: Under Water, Under Threat. An analysis of the status and distribution of freshwater species throughout mainland Africa.* IUCN, Cambridge, UK and Gland, Switzerland.

De Olieveira-Junior, J.M.B., Shimano, Y., Gardner, T.A., Hughes, R.M., De Marco Júnior, P. and Juen, L. 2015. Neotropical dragonflies (Insecta: Odonata) as indicators of ecological condition of small streams in the eastern Amazon. *Austral Ecology* **40**: 733-744.

Dijkstra, K.-D.B., Boudot, J.-P., Clausnitzer, V., Kipping, J., Kisakye, J.J., Ogbogu, S.S., Samraoui, B., Samways, M.J., Schütte, K., Simaika, J.P., Suhling, F. and Tchibozo, S.L. 2011. Dragonflies and damselflies of Africa (Odonata): history, diversity, distribution, and conservation. In: W.R.T Darwall, K.G. Smith, D.J. Allen, R.A. Holland, I.J. Harrison and E.G.E Brooks (eds.), *The Diversity of Life in African Freshwaters: Under Water, Under Threat. An analysis of the*

status and distribution of freshwater species throughout mainland Africa, pp. 126-177. IUCN, Cambridge, UK and Gland, Switzerland.

Dutra, S. and De Marco, P. 2015. Bionomic differences in odonates and their influence on the efficiency of indicator species of environmental quality. *Ecological Indicators* **49**: 132-142.

Golfieri, B., Hardersen, S., Maiolini, B. and Surian, N. 2016. Odonates as indicators of the ecological integrity of the river corridor: Development and application of the Odonate River Index (ORI) in northern Italy. *Ecological Indicators* **61**: 234-247.

IUCN (International Union for Conservation of Nature and Natural Resources). 2016. *IUCN Red List Categories and Criteria: Version 3.1*. Second edition. IUCN, Gland, Switzerland and Cambridge, UK.

Kalkman, V.J., Clausnitzer, V., Dijkstra, K.-D.B., Orr, A.G., Paulson, D.R. and Van Tol, J. 2008. Global diversity of dragonflies (Odonata) in freshwater. *Hydrobiologia* **595**: 351-363.

Kietzka, G.J., Pryke, J.S. and Samways, M.J. 2017. Aerial adult dragonflies are highly sensitive to in-water conditions across an ancient landscape. *Diversity and Distributions* **23**: 14-26.

Kipping, J., Dijkstra, K.-D.B., Clausnitzer, V., Suhling, F. and Schütte, K. 2009. Odonata Database of Africa (ODA). *Agrion* **13**: 20-23.

Kutcher, T.E. and Bried, J.T. 2014. Adult Odonata conservatism as an indicator of freshwater wetland condition. *Ecological Indicators* **38**: 31-39.

Martín, R. and Maynou, X. 2016. Dragonflies (Insecta: Odonata) as indicators of habitat quality in Mediterranean streams and rivers in the province of Barcelona (Catalonia, Iberian Peninsula). *International Journal of Odonatology* **19**: 107-124.

Oertli, B. 2008. The use of dragonflies in the assessment and monitoring of aquatic habitats. In: A. Córdoba-Aguilar (ed.), *Dragonflies and Damselflies: Model organisms for Ecological and Evolutionary Research*, pp. 79-95. Oxford University Press, Oxford.

Olson, D.M. and Dinerstein, E. 1998. The Global 200: A representation approach to conserving the earth's most biologically valuable ecoregions. *Conservation Biology* **12**: 502-515.

Olson, D.M., Dinerstein, E., Wikramanayake, E.D., Burgess, N.D., Powell, G.V.N., Underwood, E.C., D'Amico, J.A., Itoua, I., Strand, H.E., Morrison, J.C., Loucks, C.J., Allnutt, T.F., Ricketts, T.H., Kura, Y., Lamoreux, J.F., Wettengel, W.W., Hedao, P. and Kassem, K.R. 2001. Terrestrial ecoregions of the world: A new map of life on earth. *BioScience* **51**: 933-938.

Panzer, R. and Schwartz, M.W. 1998. Effectiveness of a vegetation-based approach to insect conservation. *Conservation Biology* **12**: 693-702.

Samways, M.J. 2005. Dragonflies: sensitive indicators of freshwater health. In: M.L. Thieme, R. Abell, M.L.J. Stiassny, P. Skelton, B. Lehner, G.G. Teugels, E. Dinerstein, A.K. Toham, N.

Burgess and D. Olson (eds.), *Freshwater Ecoregions of Africa and Madagascar: A conservation assessment*, pp. 19-21. Island Press, Washington DC, USA.

Samways, M.J. 2008. *Dragonflies and Damselflies of South Africa*. Pensoft, Sophia, Bulgaria.

Samways, M.J. and Sharratt, N.J. 2010. Recovery of endemic dragonflies after removal of invasive alien trees. *Conservation Biology* **24**: 267-277.

Samways, M.J. and Simaika, J.P. 2016. *Manual of Freshwater Assessment for South Africa: Dragonfly Biotic Index*. *Suricata* 2. South African National Biodiversity Institute, Pretoria, South Africa.

Samways, M.J. and Taylor, S. 2004. Impacts of invasive alien plants on Red-listed South African dragonflies (Odonata). *South African Journal of Science* **100**: 78-80.

Silva, D. de paiva, De Marco, P. and Resende, D.C. 2010. Adult odonate abundance and community assemblage measures as indicators of stream ecological integrity: A case study. *Ecological Indicators* **10**: 744-752.

Simaika, J.P. and Samways, M. J. 2009. An easy-to-use index of ecological integrity for prioritizing freshwater sites and for assessing habitat quality. *Biodiversity and Conservation* **18**: 1171-1185.

Simaika, J.P. and Samways, M.J. 2010. Large-scale estimators of threatened freshwater catchment species relative to practical conservation management. *Biological Conservation* **143**: 311-320.

Simaika, J.P. and Samways, M.J. 2011. Comparative assessment of indices of freshwater habitat conditions using different invertebrate taxon sets. *Ecological Indicators* **11**: 370-378.

Simaika, J.P. and Samways, M.J. 2012. Using dragonflies to monitor and prioritize lotic systems: a South African perspective. *Organisms, Diversity and Evolution* **12**: 251-259.

Smith, J., Samways, M.J. and Taylor, S. 2007. Assessing riparian quality using two complementary sets of bioindicators. *Biodiversity and Conservation* **16**: 2695-2713.

Valente-Neto, F., Roque, F. de Oliveira, Rodrigues, M.E., Juen, L. and Swan, C.M. 2016. Toward a practical use of Neotropical odonates as bioindicators: Testing congruence across taxonomic resolution and life stages. *Ecological Indicators* **61**: 952-959.

Vannote, R.L., Minshall, G.W., Cummins, K.W., Sedell, J.R. and Cushing, C.E. 1980. The river continuum concept. *Canadian Journal of Fisheries and Aquatic Sciences* **37**: 130-137.

Wright, M.G. and Samways, M.J. 1998. Insect species richness tracking plant species richness in a diverse flora: gall-insects in the Cape Floristic Region, South Africa. *Oecologia* **115**: 427-433.